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### A LABORATORY AND EPIDEMIOLOGICAL INVESTIGATION OF AN OUTBREAK OF WEIL'S DISEASE IN NORTHERN QUEENSLAND.

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### HISTORICAL NOTES.

In an historical survey Buchanan<sup>(1)</sup> notes that outbreaks of epidemic jaundice, especially amongst troops, have been recorded from 1745, and in some outbreaks the association of hemorrhages with the disease was observed. In 1886 Weil published his account of infectious jaundice, and the disease is

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now commonly known as Weil's disease. In 1914 Inada and Ido discovered a spirochete in the liver of a guinea-pig inoculated from a patient suffering from the Japanese form of Weil's disease. Since then many other outbreaks in various parts of the world have been recorded.

During the Great War the disease was found among British and French soldiers on the western front and also on the Italian front. G. Buchanan published his account of spirochaetal jaundice among coal-miners in East Lothian, Scotland, in the Medical Research Council of the Privy Council, Special Report Series, Number 113, 1927, and acknowledgement is made for the valuable information obtained and quoted from this work. Other later outbreaks of interest are recorded by Fletcher, in the Federated Malay States, by Schüffner, in Holland, and by Fairley in sewer workers in England.

## THE INGHAM OUTBREAK.

This preliminary report is supplementary to the clinical account of the epidemic of infectious jaundice at Ingham by Dr. C. G. Morrissey.<sup>(2)</sup> Ingham is the main town of the Herbert River district and

approximate working population in this industry in the Herbert River district is as follows:

Employed at sugar mills .. .	540
Wharf labourers .. .	35
Cane cutters .. .	916
Gang cooks .. .	109

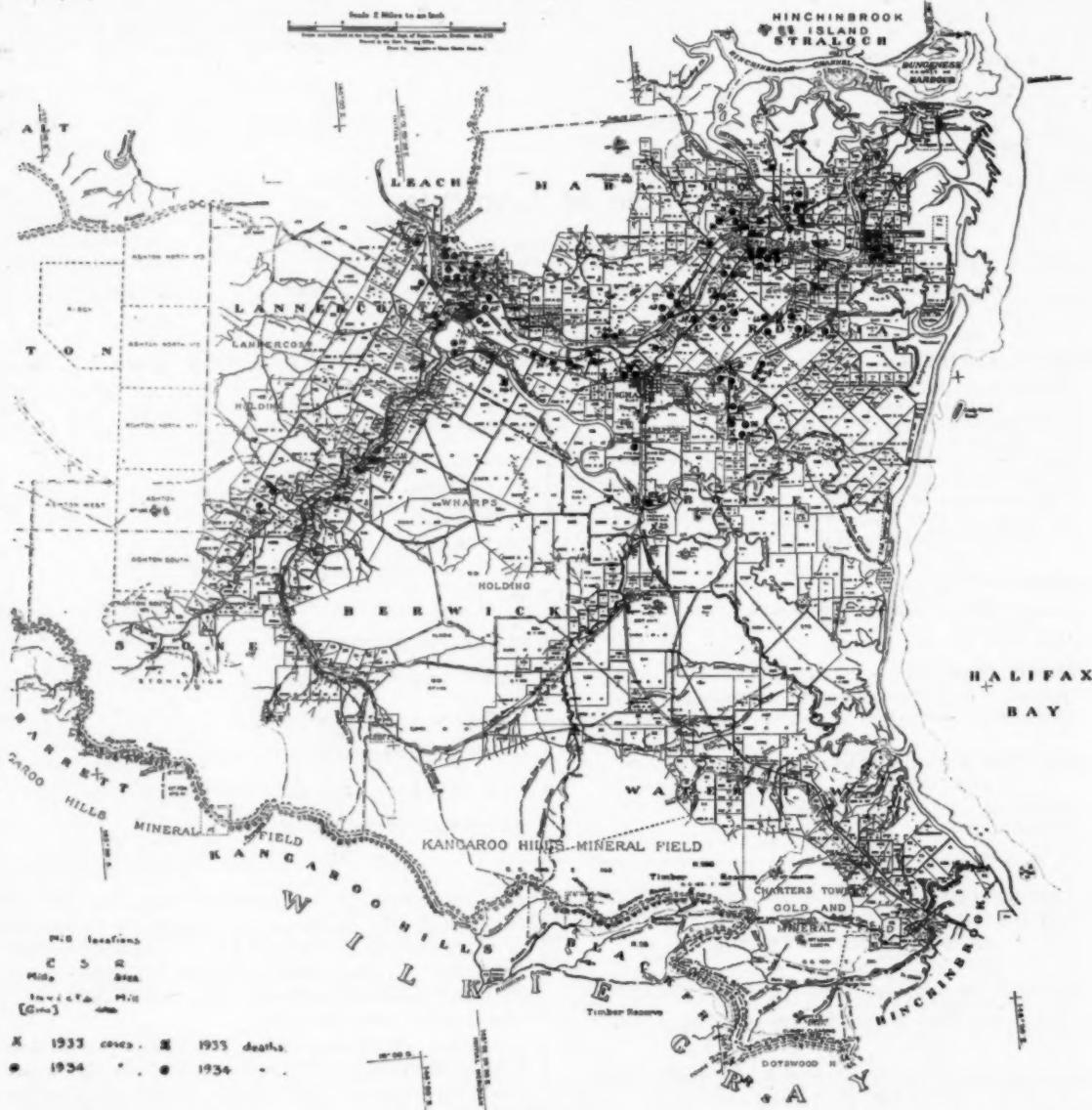


FIGURE 1.

Map of Herbert River district, showing location of farms on which cases of Weil's disease occurred. Six cases cannot be included, as they are located slightly to the north of the area covered by the map.

is situated in  $18^{\circ} 45'$  south latitude and  $146^{\circ} 10'$  east longitude, some 35 feet above sea level, 12 miles inland, in the coastal area of the tropical part of Queensland, 67 miles north of Townsville. The population of Ingham is about 2,000. The main industry of the district is sugar production. The

The number of farms supplying cane to mills is 550. The total population of the Herbert River district is about 10,000. The district covers the low-lying ground between the ranges and the sea, and is traversed by the Herbert River and many creeks. This area is in the wet belt and rainfall

is heavy, and for twenty-four years, from 1908 to 1931, averaged 79.54 inches *per annum*. During 1933 wet days were unusually numerous. The first cases of Weil's disease recorded by Dr. Morrissey were seen in October, 1933.

On notification of the outbreak, Dr. Cotter proceeded to Ingham from the Commonwealth Health Laboratory at Townsville. The *post mortem* appearances in a fatal case corresponded very closely with the descriptions of Weil's disease. Guinea-pig inoculations were made, and some animals died at varying intervals from nineteen to thirty days. The *post mortem* appearances were not diagnostic and no leptospiræ were found.

The organs of the fatal human case were sectioned and examined at the School of Public Health and Tropical Medicine, Sydney. The microscopic appearances were regarded as being con-

sistent with Weil's disease. The epidemic waned, and no further specimens were received until July, 1934, when organs of a further fatal case were examined with similar findings.

In August other cases occurred and were investigated by Dr. Cotter, and guinea-pigs were inoculated. The Director-General of Health, Dr. Cumpston, authorized a field investigation staffed from the School of Public Health and Tropical Medicine.

On August 15 a temporary laboratory was established at the Ingham Hospital for local laboratory and epidemiological investigation. On this date the guinea-pigs previously inoculated died at the Commonwealth Health Laboratory Townsville. The *post mortem* appearances of the guinea-pigs were typical of Weil's disease. The subcutaneous layer of the skin was jaundiced and haemorrhagic, par-

TABLE I.  
Daily Rainfall, in Points, at Ingham, North Queensland.

Day of Month.	1933												1934											
	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	August.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.		
1	—	3	72	—	—	—	15	—	4	130	—	60	560	175	20	75	62	—	—	12	—	—	—	
2	—	375	66	—	—	—	28	—	—	—	3	10	142	70	—	10	6	—	66	—	—	—	—	
3	—	298	66	22	—	125	132	—	—	—	5	—	20	—	10	—	—	—	—	—	—	—	—	
4	—	85	—	18	—	6	13	—	—	—	—	7	—	—	11	—	—	—	—	—	—	—	—	
5	—	10	—	—	—	4	—	—	—	—	—	—	—	—	54	—	—	—	—	—	—	—	—	—
6	—	85	—	—	—	—	—	—	6	—	—	—	—	—	16	—	—	—	—	—	—	—	—	—
7	—	105	45	—	16	—	38	65	14	—	—	—	—	—	33	—	3	33	—	—	—	—	—	—
8	—	66	46	—	25	—	—	3	5	15	152	340	30	20	—	—	—	36	—	—	—	—	—	—
9	—	68	3	69	—	—	—	—	—	—	545	—	—	—	—	—	—	—	—	—	—	—	—	—
10	—	66	—	10	35	—	56	13	—	—	138	140	65	75	57	72	—	—	—	—	—	—	—	—
11	—	568	58	69	—	—	—	—	—	—	43	—	—	45	10	13	—	—	—	—	—	—	—	—
12	—	10	—	44	—	—	3	—	—	200	—	29	15	187	10	52	—	—	—	—	—	—	—	—
13	—	28	—	—	32	—	—	—	—	—	98	7	—	35	—	—	—	—	—	—	—	—	—	—
14	—	—	10	150	3	—	6	205	—	72	—	—	—	10	5	84	—	—	—	—	—	—	—	—
15	—	—	45	180	95	—	3	15	8	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
16	—	22	—	28	4	25	—	4	15	52	—	—	—	—	—	—	—	—	—	—	—	—	—	—
17	—	—	—	22	28	9	—	—	4	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
18	—	—	—	—	13	—	62	22	—	—	—	—	—	5	130	—	—	—	20	—	—	—	—	—
19	—	—	—	—	—	—	—	—	9	—	—	—	—	30	7	13	—	—	—	—	—	—	—	—
20	—	8	—	—	—	—	—	—	—	—	38	106	—	565	—	20	—	—	—	—	—	—	—	—
21	—	10	—	—	—	—	—	10	—	—	36	—	—	100	—	2	3	—	—	—	—	—	—	—
22	—	—	6	—	26	—	6	12	—	—	—	—	—	111	—	5	—	—	38	—	—	—	—	—
23	18	—	—	18	—	—	35	—	22	3	5	15	245	14	5	—	—	—	—	—	—	—	—	—
24	—	—	160	3	—	—	—	—	18	—	12	676	50	—	20	—	—	—	—	—	—	—	—	—
25	32	—	25	25	—	—	—	—	15	—	13	10	—	—	—	15	123	23	—	—	—	—	—	—
26	57	—	10	14	—	—	4	240	—	30	—	130	27	22	—	—	128	90	—	25	—	—	—	—
27	50	—	10	17	—	—	6	28	—	—	—	255	4	27	—	—	46	—	—	—	—	—	—	—
28	—	—	3	5	—	—	—	13	—	—	146	460	—	192	5	—	—	—	—	—	—	—	—	—
29	—	—	—	23	—	—	11	5	—	10	350	180	—	6	73	—	—	—	—	—	—	—	—	—
30	—	88	—	—	—	—	5	—	—	658	205	—	135	54	—	—	—	—	—	—	—	—	—	—
Total for month	245	1,817	496	301	632	330	324	193	617	284	1,381	1,850	3,123	1,669	849	419	420	383	316	129	—	—	—	—
Number of wet days	5	17	10	15	11	9	9	13	17	6	15	11	20	20	16	15	15	6	13	4	—	—	—	—

TABLE II.  
Monthly Rainfall, in Points, at Ingham for the Years 1927 to 1934.

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total.
1927	3,111	3,628	859	555	158	435	310	23	252	166	125	600	10,222
1928	729	3,145	689	293	117	214	73	67	—	1,389	878	7,594	
1929	3,109	1,848	2,641	510	76	160	50	47	39	7	205	113	8,805
1930	—	2,524	1,804	1,851	341	808	292	109	18	80	1,915	75	529
1931	—	1,154	549	1,786	987	397	160	111	23	118	335	447	747
1932	—	1,383	350	1,565	232	1,097	80	100	141	39	52	516	1,143
1933	—	245	1,817	496	301	632	330	324	193	617	284	1,381	1,850
1934	—	3,123	1,669	849	419	420	383	316	129	—	—	—	8,470

ticularly in the region of the inguinal glands. The lungs displayed very distinctly the characteristic appearance described as "butterfly wings", showing deeply coloured, sharply defined haemorrhagic spots. Haemorrhages were present in the bowel wall and in other situations. Microscopically numerous active leptospiræ of typical morphology were seen in suspensions of liver in saline solution under dark ground illumination. On the same day, at Ingham, catheter specimens of the urine from convalescent patients were examined, and under dark ground illumination organisms considered to be leptospiræ were seen. The organisms in the urine were not as typical as those seen in the guinea-pig liver. This was noted by Buchanan,<sup>(3)</sup> who states:

Although spirochetes were found in the urine of those patients at one time or another, they appeared to be devitalized and degenerated. An explanation of this may be found in the acid reaction of the urine and the presence of bile in it, for experiments showed that these properties were not only inimical to the vitality of the leptospiræ, but also destructive to its characteristic morphology. Hence there was difficulty in establishing a diagnosis on microscopic examination of the urine alone.

Fletcher<sup>(4)</sup> noted, and the same was found at Ingham, that the leptospiræ in the urine "have numerous granules and small fragments sticking to them, which gives them a mossy appearance. Probably the presence of immune bodies causes them to attract little particles which are present in the urine in the same way as they attract bacteria when they are mixed with bacteria in the adhesion phenomenon demonstrated by Major Brown".

The urine from two patients was inoculated intraperitoneally into guinea-pigs. These guinea-pigs died some seven to nine days later. *Post mortem* an atypical inflammatory condition of the lungs was present, but no leptospiræ were detected. A suspension of the liver of one of these guinea-pigs was reinoculated, and the inoculated animal died showing typical macroscopic and microscopic appearances of leptospiral jaundice. The laboratory work, therefore, had established definite typical infections of guinea-pigs from the blood in an early case and the urine from a convalescent patient. These two strains have been passed through a succession of guinea-pigs and have produced fatal effects with typical macroscopic lesions and with very numerous leptospiræ in the liver. The animals usually die in from four to six days after intraperitoneal inoculation of liver suspension. In order to establish the leptospiral strain in southern laboratories, infected guinea-pig livers were sent in cold storage to the School of Public Health and Tropical Medicine, Sydney, and the Commonwealth Serum Laboratories, Melbourne. This was attempted, as Buchanan<sup>(5)</sup> had found that "the leptospire remained viable and virulent in infected guinea-pig liver when kept under sterile conditions in the ice chest for 26 days". Satisfactory reinoculations were made from this material. Later, living infected animals were also transported.

#### Results of Urine Examination.

Twenty-four catheter specimens of urine from convalescent patients were examined under dark

ground illumination. These specimens were centrifuged and examined immediately after collection. In ten of these specimens, motile forms, morphologically suggesting leptospiræ, were seen, and in nine, forms that were motile but the morphology of which was inconclusive. In five specimens and in a control specimen no leptospiræ were seen.

Morphological leptospiræ were observed in scanty numbers in one case nine days from the onset of disease, and the longest period from the onset was fifty-nine days; but the forms seen in this case were few in number. In one case, forty-six days from the onset, there were numerous forms. Fletcher states that there are records of persistence of leptospiræ in urine for as long as one hundred days.

#### Results of Rat Examination.

The routine examination of rats was carried out according to Ridlon's<sup>(6)</sup> method, with the exception that all the rats examined were caught alive. The rats were chloroformed and a small piece of kidney was removed and rubbed up with sterile solution. Preparations were made and examined immediately to avoid the chance of bacterial contamination. Some sixty rats were examined and seven bandicoots. The rats were caught in Ingham township and on farms in the district. The number examined from each location was too small to permit of accurate separate percentages; but of the total, approximately 30% of rats examined showed forms morphologically resembling leptospiræ. In some cases moving forms were seen, but their structure was not clear. These forms were not listed as "positive".

The examination of the bandicoots showed a probable infection of an animal not previously recorded. The rats examined included *Rattus norvegicus*, *Rattus rattus*, and *Rattus alexandrinus*. After several trials a guinea-pig was infected by inoculation of a suspension of rat kidney. This guinea-pig showed typical macroscopic and microscopic appearances of leptospiral infection. It was noted that positive results were found more frequently in old rats than in young rats, and that the kidneys of infected rats appeared browner and more friable than normal rat kidneys. The examination of a series of local rats at Townsville revealed no leptospiræ; but of five rats caught at Innisfail one was "positive" microscopically, and this finding was subsequently confirmed by animal inoculation. The presence of heavy rat infection in the Ingham area was thus ascertained, and also the important fact that rat infection was present in the Innisfail area north of Ingham. Both of these areas are in the wet belt. In the drier area at Townsville no infected rat has yet been found.

#### Water Examination.

Several samples of water were examined microscopically, and in two samples from drainage canals from cane farms morphological leptospiræ were found. Preliminary attempts at guinea-pig infection from water were made. Guinea-pigs

scarified on the abdomen and legs were immersed for over one hour in drainage canals on farms on which human cases had occurred, and certain guinea-pigs were also inoculated subcutaneously. Suggestive appearances were obtained in one guinea-pig; but further confirmation is needed. Schüffner<sup>(7)</sup> states that although it is easy enough to infect guinea-pigs by dipping them into water artificially contaminated with leptospiral cultures, he was unable to bring about this infection with naturally contaminated water. Buchanan, however, succeeded in infecting guinea-pigs from slime from the walls of a mine in Scotland.

#### **Microscopic Appearance.**

##### *Appearance by Dark Ground Illumination.*

Examination by dark ground illumination was found to be the most suitable method. The morphology and movements of the organisms corresponded in all respects with the descriptions by previous writers. The leptospiræ showed up as fine, brightly illuminated filaments, and when clearly focused showed very fine spirals. The ends frequently had a hooked appearance, and the organisms when motile showed rapid rotation, and when in contact with particles of tissue gave the impression of burrowing into the tissue. The rotation movements at times gave a bulbous appearance to the extremities. Fletcher found that the organisms varied in length from  $3\mu$  to  $40\mu$ , but were generally about  $14\mu$  to  $15\mu$ . In our specimens it is thought that the average length would be about  $14\mu$ . Smaller forms were at times considered to be present in specimens from rat kidney.

##### *Stained Preparations.*

As the dark field method had proved very satisfactory, stained preparations were not employed to any great extent. Preparations were fixed with osmic acid and stained by Giemsa and Leishmann stains. When examined by ordinary illumination, the general form of the organism could be seen, but the spirals were not clearly visible. The panoptic method of staining recommended by Dr. A. W. Turner, of the Animal Health Research Station, Townsville, gave the most satisfactory results, and when the preparations were examined by dark ground illumination a beautifully clear picture showing resolution of the spirals was obtained. We are also indebted to Dr. Turner for the excellent microphotographs of the leptospiræ that are reproduced here. In some cases good results were obtained in tissue preparations by Levaditi's method.

Even in the dark field illumination method precaution in interpretation is necessary. Wenyon<sup>(8)</sup> states:

In the examination of fluids containing blood it has to be remembered that various filaments or "pseudo-spirochætes" may occur as a result of changes in the red blood corpuscles, as first described by Addison (1861). These frequently bear a striking resemblance to leptospiræ, but they are not so actively motile as living leptospiræ, do not have the closely wound spiral structure, and cannot be satisfactorily stained in dried films.

#### **Artificial Cultivation.**

Work on artificial cultivation is at present in hand and various media are being tried, with promising results.

#### **Immunity and Serology.**

##### *Natural Immunity.*

Man and guinea-pigs apparently possess little or no natural immunity, and infection has been, in our experience, regularly fatal in guinea-pigs. Dogs are also considered to be susceptible. Certain other animals, particularly rats, possess marked natural immunity. These rodents serve as chronic carriers, as leptospiræ survive in the kidneys and are excreted in the urine. The results of the examination of wild rats have been given, and inoculation of laboratory rats has not produced death in our trials up to the present. Most other laboratory animals are stated to be immune.

##### *Acquired Immunity.*

The Medical Research Council's "System of Bacteriology"<sup>(9)</sup> states:

Human patients generally show the presence of immune bodies in their serum towards the end of the second week of the disease. This immunity is of very long duration, for Uhlenhuth and Fromme (1918) found the serum was still protective twenty-two and a half years after an attack of the disease.

Passive and active immunity have been produced in the guinea-pig.

#### *Serum Therapy.*

Therapeutic sera have been prepared in several countries by the inoculation of leptospiræ into horses. The results are stated to be favourable if the serum is given in the early stages of the disease. The Medical Research Council's "System of Bacteriology"<sup>(10)</sup> quotes the following results of serum therapy in Japan:

The results of serum therapy in Japan seem to indicate that it has some slight effect on the course of the disease, for in one epidemic with a mortality of 30·6 per cent. in untreated patients, those receiving serum treatment showed mortalities of 23·7 per cent. after intravenous and 17·3 per cent. after subcutaneous injections respectively. Another epidemic with the high mortality of 57 per cent. showed a mortality of 40 per cent. after subcutaneous and 38·5 per cent. after intravenous injections of serum (Inada, 1917).

#### *Epidemiological Survey.*

For many years along the coastal belt of north Queensland cases of fever have occurred which have been designated by various names, such as Mossman fever and coastal fever. It is probable that there is more than one cause of these fevers, and the establishment of Commonwealth Health Laboratories had as one objective the elucidation of this problem. Cases of endemic typhus, pyocyanous infection, and atypical typhoid infections have been established.

As long ago as January, 1929, Dr. A. H. Baldwin, who was at that time in charge of the Australian Institute of Tropical Medicine at Townsville, suspected, on clinical grounds, the existence of leptospirosis amongst this group of fevers, and

animal inoculations were made, which, however, revealed no evidence of leptospirosis.

The prompt diagnosis by Dr. Morrissey and Dr. Leckie of the outbreak of leptospirosis at Ingham in October, 1933, afforded an opportunity for the definite identification of this disease.

The laboratory aspects have been described; but the epidemiological features of this outbreak present aspects of great interest and importance. Since October, 1933, approximately 138 cases have been seen, with seven deaths—a mortality of 5%. It is almost certain that there have been patients who did not report to a medical practitioner and so are not included in the 138 cases. One such person was interviewed and others were reported. The mortality rate is stated in the literature to vary from approximately 5% in Europe to 33% or even 57% in Japan, so that, taking into account unrecognized cases, the mortality of the Ingham outbreak has been as yet comparatively low. As the number of persons exposed to risk is not definitely known, the incidence is uncertain, but for cane-cutters it is estimated by Dr. Morrissey as 18%. In all the cases so far diagnosed the patients were adult males and all were cane-cutters with the exception of a few cane-farmers, and the latter, from the aspect of probable exposure, approximate to cane-cutters. No women or children are known to have been infected, and no case to case infection has been observed. The cane-cutters live in barracks that are generally located close to the farmhouse. These barracks are of standard construction, with cement floors. Often the food is open to contamination by rats; but this also applies to some of the farms. As to the possibility of a drinking water infection, the water is generally drawn from local wells that are frequently open to pollution, but no cases have occurred in the families of the cane-farmers. The above data strongly point to a field infection, and particularly to a field infection associated with cane.

#### *Location.*

All cases concerning which information was available were listed chronologically, and with the aid of the District Health Inspector were plotted on the map of the district according to the farms on which they had been working. The location in general corresponded to wet areas along the course of the rivers and creeks. It is true that these areas are most suitable for cane growing and therefore are more thickly populated; but it must also be noted that no cases came from the township of Ingham. Information was obtained as to the drainage of the farms on which cases had occurred. The drainage in most instances was poor; but this was not universal: in one area where the drainage was satisfactory there were a number of cases.

#### *Rat Infestation.*

In the Ingham district there is much rat infestation in spite of trapping and poisoning. A measure of the rat infestation can be obtained from the amount of rat-damaged cane. The graph, which was com-

piled by Mr. Gard, of the Macknade Mill, and is published by permission of the General Manager of the Colonial Sugar Refining Company, Limited, shows the amount of rat damage compared with the rainfall. The marked increase of rat damage during the past few years is to be noticed; this denotes a great increase in rat infestation.

COMPILED FROM RECORDS AT MACKNADE MILL—DOES NOT REFER TO WHOLE DISTRICT  
FIGURES FOR PER CENT RAT DAMAGE FOR ALL YEARS PRIOR TO 1931  
MUST BE ACCEPTED WITH SOME RESERVE AS THEY WERE NOT AS

ACCURATELY DETERMINED AS IN 1931, 1932, AND 1933.

- RAINFALL DURING PERIOD JANUARY TO APRIL—WET SEASON.
- RAINFALL DURING PERIOD MAY TO DECEMBER—DRY SEASON.
- PER CENT RAT DAMAGE.

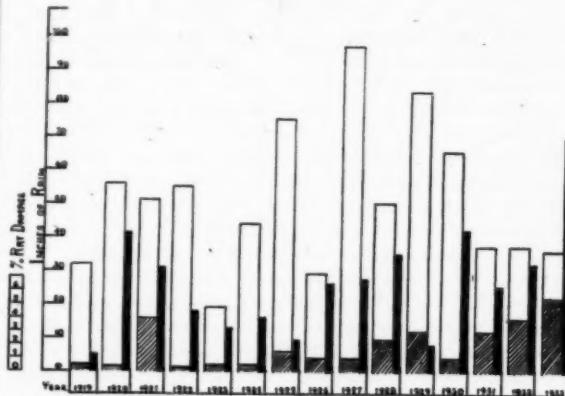


FIGURE III.  
Graph showing rat damage to cane, and rainfall.

The laboratory investigation showed that a considerable number of the rats of the area contained organisms morphologically similar to leptospiræ, and inoculation proved that the leptospiræ in the



FIGURE IV.  
Cane-farmer, cane-cutters and health inspector standing in front of barracks.

rat kidneys were pathogenic to guinea-pigs. Infected rats were found in the township of Ingham as well as on outlying farms. Information was obtained as to the state of rat infestation of the farms on which cases had occurred. For the most part inspection of these farms showed heavy infestation. An

inspection of the cane fields showed that the cane stalks frequently showed rat damage, often large portions being eaten out, usually somewhat above the ground.

Weil's disease throughout the world has been associated with the presence of rats. The association



FIGURE V.  
Showing burnt cane and standing cane.

of rats with the disease appears to be as significant in this epidemic as in outbreaks in other parts of the world.

### *Meteorological Data.*

The rain map indicates the position of the district in the wet belt of Queensland, and the rainfall figures show that 1933 was noticeable not only for the abnormal amount of rain, but also for the number of wet days. This undoubtedly produced swampy conditions in the low-lying ground, which can probably be considered as favourable for leptospiral existence and multiplication.



FIGURE VI.  
Showing rat "cover" near Ingham.

As Dr. Morrissey has pointed out, the cases usually are frequent some ten days after heavy rain. The incubation of a laboratory infection recorded by Schüffner<sup>(11)</sup> was seven days. This case is of particular interest, as it demonstrates the rapidity of infection. Schüffner records:

On 24th September, 1931, at 9 a.m., my assistant, D.S., while at her work in my laboratory, was suddenly taken ill with a rigor, vomiting, and most distressing pains in the calves, the thighs and the loins. Within half an hour her temperature rose to  $39.1^{\circ}$  C. Examination for malaria parasites gave a negative result; accordingly a search for leptospiræ was made, and these were found on examining the blood plasma separated from the red blood

corpuscles by centrifugation. Seven days earlier Miss S. had slightly cut her finger by the breaking of a test tube containing a culture of virulent leptospiræ. The small wound, which bled rather copiously, was disinfected at once with tincture of iodine and carbolic acid, but this treatment evidently did not prevent the infection.

*Periods during which Cane-Cutting is Undertaken.*

The cane-cutting periods are best indicated by the dates mills commence and cease crushing. These dates for 1933 and 1934 are as follow:

	Victoria Mill.	Macknade Mill.
1933-1934.		
Crushing commenced	June 20, 1933	July 5, 1933
Crushing ceased ..	January 6, 1934	January 2, 1934
1934-1935.		
Crushing commenced	June 13, 1934	June 20, 1934



FIGURE VII.  
Showing rat "cover" along railway track.

### *Monthly Incidence of Cases.*

Taking the cases admitted to the Ingham General Hospital with Weil's disease, concerning which the dates of admission are accurately known, the monthly incidence is as follows:

							Number of Cases.
1933.							
	October	.	.	.	.	.	8
	November	.	.	.	.	.	9
	December	.	.	.	.	.	4
1934.							
	January	.	.	.	.	.	3
	February	.	.	.	.	.	1
	March	.	.	.	.	.	3
	April	.	.	.	.	.	2
	May	.	.	.	.	.	0
	June	.	.	.	.	.	5
	July	.	.	.	.	.	27
	August	.	.	.	.	.	38

The patients admitted in February, March and April were not listed as cane-cutters, but in most instances as farmers.

It can be seen that the recurrence of cases mentioned by Dr. Morrissey as commencing on June 26, 1934, bears a relation to the opening of the cutting season, and it is also to be noticed that the first few patients came from farms supplying the Victoria Mill, which opened a week before the Macknade Mill.

### **Mode of Infection.**

The exact mode of infection is still open to doubt. Topley<sup>(12)</sup> states:

*Leptospira icterohaemorrhagiae* is killed by moist heat at 50-55° C. in half an hour; it can withstand freezing. It is very sensitive to acid, being destroyed by human gastric juice in 30 minutes.

As to viability, Buchanan<sup>(18)</sup> has found:

That in the ground soil culture motile leptospiræ (2-3 in a microscopic field) were found by dark ground illumination up to the ninety-fifth day after inoculation. Guinea-pig inoculation at this time with about one cubic centimetre of the wet soil did not produce infection. In two tubes containing different samples of pit water leptospiræ were found, feebly motile, however, up to the seventy-fifth day after inoculation. The reaction of the water and soil in these tubes remained slightly alkaline, whereas in the other nine tubes the slime and water medium became acid and overgrown with other organisms after the fourth day at 12° C.; no leptospire were ever recognized in these cultures after the fourth day of inoculation.

In the Ingham cases infection through the mucous membrane of the mouth has to be considered. The food of the cane-cutters is frequently open to rat contamination; but against this mode of infection is the fact that no case has occurred in the families of the cane-farmers, whose food is also often exposed to rat contamination. The water supply of the cane-cutters is in many cases the same as that used by the cane-farmer and his family. The ease and rapidity of infection through skin lesions is exemplified by the laboratory infection recorded by Schüffner. The cane-cutters in general have inadequate protection for the feet and ankles and no protection for the hands and forearms, and scarifications of the arms and legs are extremely common.

It is highly probable that both the swampy ground and the cane-stalks are contaminated by leptospiræ, the latter from the urine of the rats passed whilst feeding. Both the swampy ground and the cane stalks are therefore possible sources of infection. Should the former be the sole source of infection, it is rather surprising that cases have not occurred among the families of cane-farmers and that more cases have not occurred among the cane-farmers themselves. It is quite possible that many patients are infected by the entrance of leptospiræ through lesions of the hands and forearms when cutting cane contaminated by rats. The fact that

cases occur most frequently in dry weather, immediately after wet weather, and then, after further dry weather, tend to diminish, may have its explanation in that during wet weather the bulk of the leptospiræ may be washed from the cane, and that on continuance of dry weather the organisms on the cane are unable to withstand drying, and perish. There is, however, insufficient data to warrant any definite opinion.

#### Means of Prevention.

The combination in the Ingham district of moist conditions favourable to the existence of leptospiræ, the presence of rats (known carriers of the disease) in great numbers, and an industry which necessitates exposure of the workers, raises a problem of great difficulty.

In situations such as mines, drainage has been advocated to get rid of infected water. In the Ingham district the excess of water is intermittent and the nature and area of the country render this solution impracticable. In Japan success in eliminating leptospiræ from the soil has been obtained by the use of calcium cyanamide as a fertilizer. There is considerable evidence that leptospiræ are very sensitive to the hydrogen ion content of their environment. Temporary sterilization of the cane and the surface of the soil has already been attempted by the expedient of burning the cane before cutting. The fierce heat generated by such fires must have an effect in producing a local and temporary sterilization, and therefore lessen the risk of infection; but there are practical and economic difficulties in this method.

Not only in the present outbreak in Queensland, but in outbreaks in other parts of the world, there is very strong evidence to incriminate the rat as a carrier of the disease capable of infecting its environment. In the Ingham area the rat may be of particular importance, as the flooding of the land is intermittent, and but for reinfection of the water

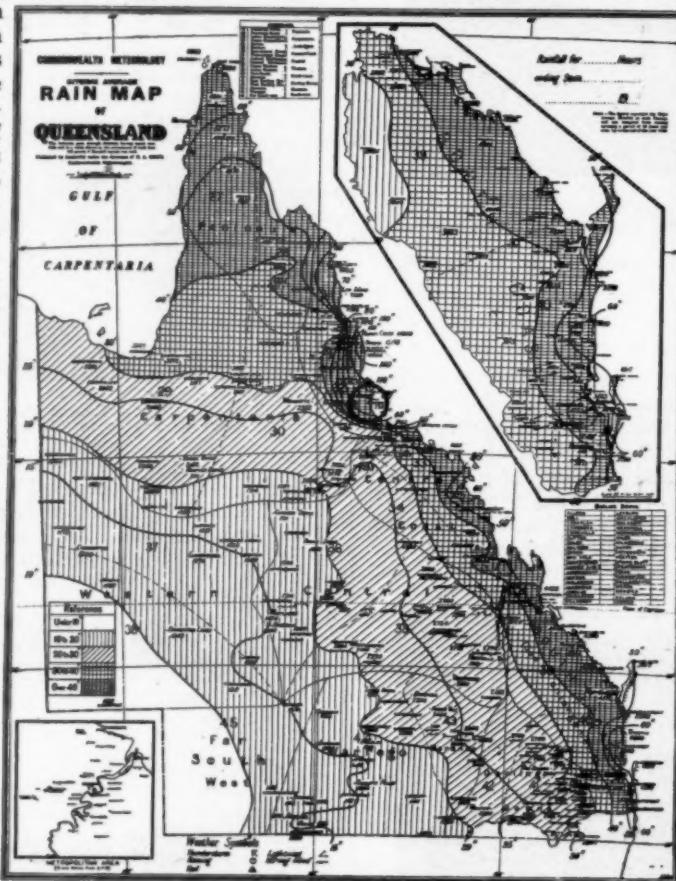


FIGURE VIII.  
Rain map of Queensland, showing location of Ingham.  
(Map prepared by Commonwealth Department of Meteorology.)

ILLUSTRATIONS TO THE ARTICLE BY DR. T. J. P. COTTER AND DR. W. C. SAWERS.



FIGURE II A.



FIGURE II B.



FIGURE II C.



FIGURE II D.



FIGURE II E.

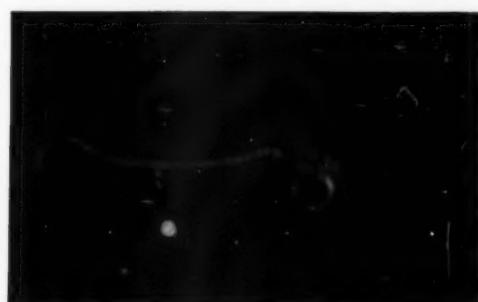
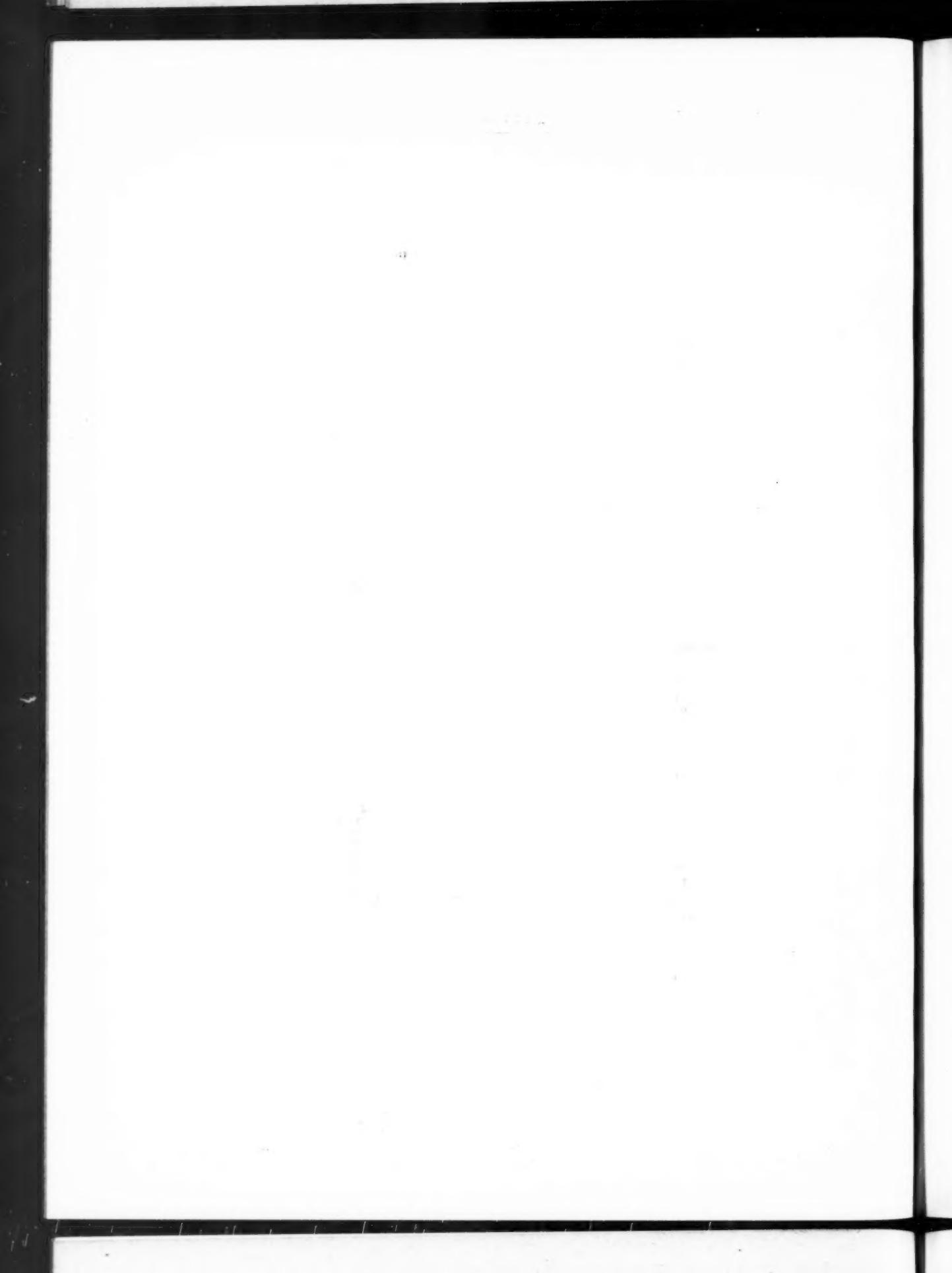


FIGURE II F.

Leptospire in suspension of liver of infected guinea-pig, as seen by dark ground illumination. (Microphotographs taken by Dr. A. W. Turner, Animal Health Research Station, Oonoomba, Townsville.)  $\times 3,600$ .



the problem would not be so acute. The conditions in the cane areas are extremely favourable for rats, food and cover being plentiful; as a result they are present in vast numbers. The destruction of rats is undoubtedly advisable; but an inspection of the country shows the magnitude and difficulty of the task.

The persistence of leptospiræ in the urine of human convalescents raises the question of the danger of human carriers. Although this possibility is present, there is little evidence that human carriers play an important rôle in the spread of the disease. A possible method of infection, of which one suspected case is recorded, is by marital relationship. In the Ingham outbreak there has been no evidence of spread by human carriers. General measures to prevent access of the organism to the mucous membrane of the mouth and to abraded skin are advisable; but the nature of the work of cane-cutting and the climatic conditions render satisfactory application difficult. It is probable that persons recovered from the disease possess considerable immunity, and this naturally acquired active immunity may tend to decrease the incidence of the disease in the district. Artificial active immunization has been successfully attained in laboratory animals, and with further investigation may prove a possible means of prevention in man.

#### Discussion.

The origin of this epidemic raises speculations of interest, and there are several possibilities that may be considered. It may be possible that water leptospiræ invaded rats, and after passage through the rat increased in virulence, and that ultimately human cases occurred. Another more likely explanation is that leptospiræ, which have been found in rats in many parts of the world, may have been introduced into the district by a rat carrier, and multiplied in an environment peculiarly suitable both in respect to water and to the rat carrier. Finally, but less probably, a human carrier may have been the means of introducing the organism. In this respect it is interesting to note that outbreaks of Weil's disease occurred in the trenches during the Great War, and that included in these was an outbreak on the Italian front. Rather in favour of the latter two possibilities is the fact that keen observers, like Dr. Morrissey and his colleagues at Ingham, are of the opinion that they have not seen cases of this nature prior to October, 1933. The finding of an infected rat in the Innisfail area points to the possibility that cases will be identified in other areas, as the conditions in the sugar belt along the coast north of Ingham must be regarded as suitable for both rats and leptospiræ. In the drier areas south this danger should not be so marked.

Weil's disease, coastal fever, Mossman fever and Sarina fever have been declared to be notifiable diseases with respect to the whole State of Queensland. The notifications will afford valuable data and help to insure the early laboratory investigation that is so essential in diagnosis.

This report has been compiled under somewhat short notice, in order that the laboratory and epidemiological findings could be available in conjunction with the clinical data that have been recorded by Dr. Morrissey. Of necessity much detail has had to be omitted; but an endeavour has been made to set out the main items of importance in this epidemic and to discuss briefly their significance.

#### ACKNOWLEDGEMENTS.

We are particularly indebted to Dr. C. G. Morrissey, who, throughout the whole investigation, most generously afforded help and facilities in all respects. To Dr. T. Leckie and Dr. Piscitelli we are similarly indebted.

Dr. F. McCallum, Chief Quarantine Officer (General), North-Eastern Division, directed this investigation, and we owe much to his direction and constant assistance.

Messrs. I. F. Stephens and A. R. Tremain, B.Sc., of the Commonwealth Health Department, were associated with us in carrying out this work, and its success has been in great part due to their very able help.

We have also to acknowledge in general terms assistance from many other sources at Ingham and elsewhere, and it is regretted that it is not possible to make individual acknowledgement.

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#### ALLERGY IN THEORY AND PRACTICE.<sup>1</sup>

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#### Introduction.

THE phenomena of anaphylaxis were first described by Richet early in the present century.

<sup>1</sup> Read at a meeting of the Victorian Branch of the British Medical Association on August 18, 1934.

Following his discovery, immunologists quickly recognized that certain features of asthma in man closely resembled anaphylaxis as seen in laboratory animals. However, whilst protein is responsible for the reaction in experimental animals, non-protein substances, including simple drugs, may be the exciting agents responsible for the symptoms in man. Hence a new term was introduced to include all varieties of hypersensitivity. The name selected was "allergy", a word which means altered reactivity; and, when used in a broad sense, as it is by many writers, not only includes anaphylaxis, but such diverse conditions of hypersensitivity in man as hay fever, asthma, eczema, angioneurotic oedema and several other clinical syndromes. Much controversy has centred round the ability or inability to demonstrate antibody in the blood of allergic subjects who may show a strongly marked cutaneous reaction to some sensitizing substance, such as pollen. That some specific antibody or reagent does circulate in the blood of allergic individuals is shown by the Prausnitz-Kustner reaction. In the original test the serum of Kustner, who was sensitive to fish, was introduced into the skin of Prausnitz. It was then demonstrated by intradermal tests that the skin of Prausnitz had become locally and passively sensitized to fish at the site of injection. It has been stated, particularly by American authorities, that, following desensitizing injections in man, there is frequently no decrease in either skin sensitivity or of the reagent content of the blood, though the patient may be clinically greatly improved. Recent work by John Freeman, of London, and his colleagues has demonstrated that in treatment of hay fever not only is the reagent content of the blood decreased, but the cutaneous tests may entirely disappear. This result is achieved only after prolonged treatment, very strong pollen extracts being finally used. This work of Freeman certainly brings the interpretation of desensitization in man into much closer harmony with that which occurs in the anaphylactic laboratory animal. On the other hand, anaphylactic hypersensitivity in animals is an acquired state and is not inheritable. It cannot be transmitted from a sensitized male parent, but it can be passively transferred through the placenta of a sensitized mother to the offspring. In case of allergy in man, a definite familial tendency to develop hypersensitivity of some kind occurs and it may be transmitted through either father or mother. It should be noted that the exciting agent is termed the allergen or atopen and the allergic antibody is referred to as the allergin or reagent.

#### Hay Fever.

Hay fever, pollen allergy or pollerosis is caused by the inhalation of pollen. Hay, as made in Australia, from the cereals wheat and oats, is not a common cause of hay fever. In England meadow hay consists of grasses, and these throughout the world are the common cause of pollen allergy in the spring months. This is largely due to the abundance of pollen liberated, to its buoyancy and to the

smooth character of the individual grains. The pollen is so light—many varieties approximate in size to a red blood corpuscle—that it may be carried ten to twenty miles in a strong wind and it may ascend several thousand feet in upward air currents. It cannot be too strongly emphasized that wind-pollinated plants (anemophilous), such as grasses, are the cause of hay fever and only to a very minor degree are garden flowers, which have a sticky pollen and are usually insect-pollinated (entomophilous). In a large series of hay fever patients whom I have personally tested, over 90% reacted to grass pollen. The chief chemical constituents of pollen are cellulose, starch, invert sugar, protein and a ferment diastase. Freeman maintains that the allergen in grass pollen is identical for all varieties of grass; hence, if a person is sensitive to one member, then he will be sensitive to all members of the order Gramineae. The intensity of the sensitivity to each individual member depends on the concentration of the common allergen in the pollen. Thus a person may show marked reaction to rye grass, but only slight reaction to *Poa annua*. This would be interpreted as indicating that the allergen which is common to both grasses is in much greater concentration in the rye grass. Stull *et alii* claim to have demonstrated that the allergen in timothy grass pollen is an albumin. They claim that it is the only active substance in the pollen and that no reaction occurs with globulin. Heating lessens the activity of the extract. On the other hand, Moore *et alii* have brought evidence that albumin, globulin and proteose each give specific reactions, and therefore contend that at least three allergens are present. Coca and Grove maintain that the allergen is not diminished by the digestion of the proteins present in the pollen and dialysis of the disintegration product. Furthermore, there is evidence that, whereas the protein moiety determines the allergic property of pollen, carbohydrate linkages in the protein determine the specificity of the complex. The carbohydrates themselves are never antigenic. The question, then, of the exact nature of the allergen in pollen is still *sub judice*. Although grass pollen grains are small, other types of pollen grain may be comparatively large. The variation in diameter in different botanical orders ranges from six to one hundred and eighty microns. Ragweed (*Ambrosiaceæ*) and wormwoods (*Artemisiaeæ*) are common causes of autumn hay fever in the United States of America. In Australia capeweed (*Compositæ*) is a minor cause of spring pollerosis. The sticky nature of its pollen and the presence of numerous spicules on its surface prevent its being as readily disseminated as grass pollen, and hence it is not a serious cause of hay fever in this country. Sunshine is a stimulus to pollen production, and pollination is most marked in the morning hours. Rain for several days practically clears the air of pollen.

The symptoms of hay fever—rhinorrhœa, sneezing, lachrymation, blockage of the nose and Eustachian tube—are so well known that it is unnecessary to discuss them further. It is always wise to inquire

whether the patient has perennial sneezing and rhinorrhœa, indicating some other complicating fact, such as sensitization to house dust, orris root, horsehair and other substances, in addition to the seasonal pollen irritation. Failure to recognize such additional factors may be responsible for incomplete relief of symptoms despite adequate pollen injections. As an illustration, suppose a dairy farmer is sensitive to cow hair and grass pollen. Such a person may be satisfactorily desensitized to the pollen, but if the sensitization to cow hair is not recognized and treated, then rhinorrhœa and other symptoms of hay fever may persist. The diagnosis of pollen allergy is determined by cutaneous tests, either scratch or intradermal, details of which have been frequently described. The decision as to which pollen solution to use in treatment has been a matter of much controversy. In Australia the pollen of wattles and other trees can be largely ignored, as also garden flowers. Capeweed may be indicated in some cases, but the main question to decide is whether one grass pollen will desensitize for the whole order Gramineæ. Piness and Miller have performed experiments which indicate that each member of the Gramineæ has some specific allergen together with another allergen in greater or less degree common to all members of the order. They thus postulate a certain amount of specificity for each species. Benjamins, Idzera and Nienhuis in Holland claim that the allergens in different grasses are not identical. The skin of a patient having been desensitized to one grass pollen, according to them, may still give marked reaction with other grass pollens. These findings are directly opposed to those of Freeman, who recently demonstrated that by using concentrated extracts of Dactylis (cocksfoot) he not only caused the skin reaction to disappear for Dactylis, but also for Holcus (Yorkshire fog) and Phleum (timothy).

In view of this divergence of opinion, it is my practice as a rule to use for desensitizing purposes solutions of two or three members of the order Gramineæ, for example, rye, cocksfoot and perhaps Yorkshire fog and prairie grass. In England, timothy grass pollen is almost entirely used for desensitizing purposes. Commencing in the autumn or early winter with a weak extract—10 or 100 units per cubic centimetre—injections are given at intervals of two to four days, the doses being gradually increased. Authorities in America have for some time taught that there is an optimum dosage of between 5,000 and 10,000 units to which the injection administered to the patient should finally approximate. These allergists further teach that to increase the dose above this optimum may diminish the otherwise favourable result of treatment. As has already been stated, Freeman and his colleagues in England, and Grafton Tyler Brown in America have in recent years increased the dose to 100,000 units with most satisfactory results. To understand the reason for this divergence of opinion as to the correct dosage, it must be realized that Freeman's treatment is essentially pre-seasonal,

commencing some months before the usual onset of the pollen season; and by gradually and very carefully increasing the dose to the 100,000 unit strength the clinical results have been practically perfect. The cutaneous tests have entirely disappeared and the reagin content of the blood has greatly diminished. American allergists, on the other hand, have frequently administered pre-seasonal and then co-seasonal treatment, in which the patient might be having injections of 5,000 to 10,000 units and is at the same time absorbing from the pollen-laden atmosphere a further unknown quantity of allergen. The results under these conditions of treatment are very much less satisfactory than in the strictly pre-seasonal treatment. The cutaneous reaction may still persist and the reagin content of the blood may not diminish. A further type of treatment is known as the perennial treatment, in which, once the maximum pre-seasonal dosage is reached, for example, 100,000 units, a further series of injections every three or four weeks is given throughout the spring, summer and autumn, but with a somewhat diminished dosage so as not to induce any undue reaction. This is particularly desirable in the summer and autumn, that is, after the hay fever is over, as by this means the patient's immunity is maintained at a high level and the number of injections in the pre-seasonal treatment for the next year is very much less than without such perennial treatment. My own experience is that perennial injections plus high pre-seasonal dosage gives most satisfactory results. The "rush" inoculation method of Freeman, in which injections are given every two hours for a few days, may be adopted when patients present themselves for treatment during the hay fever season, but is not as satisfactory as the treatment previously described. The use of ephedrin orally and in sprays or drops containing "Novocain", adrenaline and ephedrin for symptomatic relief may be of considerable value if complete immunity has not been attained by injections. Carbon dioxide liberated into the nostrils may also have a soothing effect.

There is no doubt that untreated hay fever is a very common precursor of bacterial infection in the nasal sinuses, and also of bronchial asthma, so that, quite apart from the discomfort of hay fever, the patient has always lurking in the background the development of the more serious complications.

Before leaving the subject of pollen allergy, reference will be briefly made to the extracting agents used and the method of standardizing pollen extracts. Many extracting solutions have been advocated for the preparation of the pollen allergen. Goodale, after soaking the pollen in water for a few hours, added alcohol to make a dilution of 13% to 15% by volume. Coca's solution contains sodium chloride, sodium bicarbonate and carbolic acid, the solution being saturated with carbon dioxide. Glycerol with saline solution is frequently used as the extracting agent. A 1% extract of pollen is referred to as a 10,000 unit strength. Instead of standardizing the solution by this simple gravimetric method, many authorities determine the

total nitrogen content of the solution or the protein nitrogen content and standardize the extract on these nitrogen figures. All extracts should be sterilized by filtration through a Berkfeld or other such filter. The solutions gradually lose strength and should be kept at low temperature and in concentrated form. It is important when changing to a fresh extract of apparently similar strength to that which the patient has been receiving, that the dose should be diminished, otherwise a general reaction of an unpleasant character may be induced.

#### Allergic Rhinitis.

Allergic rhinitis, or the perennial type of hay fever, is usually associated with multi-sensitization to such factors as house dust, occupational dust, foods, animal epithelia, drugs, cosmetics or insect powders. The symptoms occur at any time of the year and may aggravate true seasonal hay fever. The mild "head cold" is frequently mistaken for primary nasal disease. Local itching is the outstanding feature in allergic nasal conditions and must always be inquired for. Treatment consists in the avoidance of the cause, such as feathers, horse hair and other things which may be possible, whilst in some instances desensitization must be performed, preferably whilst the patient is temporarily removed from the causative factor. The symptomatic treatment used for seasonal hay fever may also be employed.

#### Asthma.

We may define asthma as a condition characterized by contraction of the bronchiolar muscle and associated with oedema of the bronchiolar mucous membrane.

#### Age Incidence.

In some 4,000 cases of asthma under the care of various allergists the percentage age incidence was as follows: first decade, 33%; second, 14%; third, 17%; fourth, 16%; fifth, 10%; and sixth, 5%. Approximately one-third of all cases of asthma have their onset during the first decade, and of these one in four commences in the first year.

#### Inheritance.

Heredity predisposition is present in nearly 70% of cases, as is evidenced by the family history. Transmission is much more frequent through the mother than the father. Two methods of inheritance occur: (a) germinal or chromosomal, (b) placental or serum sensitization. There is evidence that the inheritance may be partly Mendelian in character; it is, however, probable that in many cases the sensitizing agent is transmitted through the placenta of the mother to the foetus (active sensitization) or, more rarely, transfer of allergens from a sensitized mother may occur (passive sensitization). Hay fever, asthma, eczema, angioneurotic oedema, muco-membranous colic or migraine may individually or severally be manifested in the children of asthmatic parents.

#### Etiology.

The chief causes of asthma are depicted in the accompanying diagram.

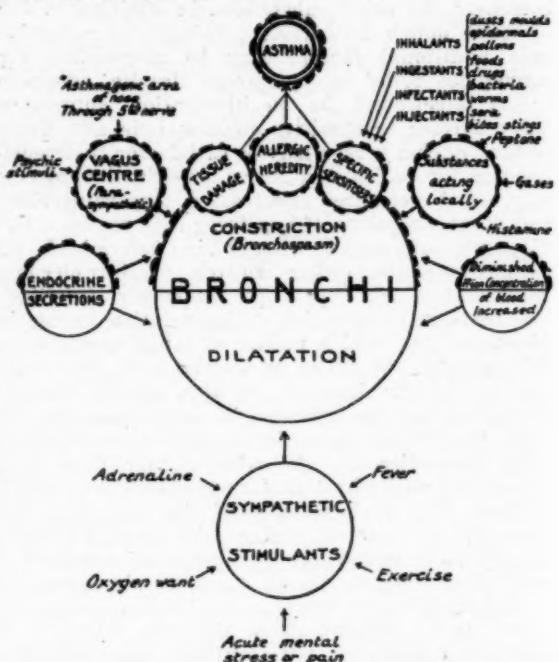


Diagram from "Recent Advances in Allergy", by G. W. Bray, showing the chief causes of asthma.

This diagram is practically self-explanatory. Some brief comments alone are necessary.

(a) *Asthmagenic Area of the Nose*.—The nasal septum and the nasal accessory sinuses have long been recognized as asthmagenic areas. Reflexes from this region may take place via the trigeminal and vagus nerves to the bronchioles. The vagus nerves are constrictor to these tubes. In the case of sinus infection, sensitization to bacterial protein may also ensue or constriction of the bronchioles may occur, due to bacterial disintegration products of a histamine-like character. A considerable percentage of asthmatics has nasal sinus infection.

(b) *Psychic Stimuli*.—Asthma of purely nervous or psychic origin is probably rare; usually the neurogenic factor, when operative, is ingrafted on an allergic diathesis. The state of apprehension undoubtedly tends to aggravate asthma, and this aspect of the syndrome must always be considered in treatment. To illustrate how important the chemical factor, as opposed to the neurogenic factor, is in asthma, let us consider a patient who is highly sensitized to capeweed pollen. An overdose of a strong extract when injected can, with monotonous regularity, induce a profound attack of asthma in such a patient at any time of the year. A similar dose of pollen extract administered to a highly neurotic patient, yet not specifically sensitized to capeweed pollen, would not have the slightest effect on his bronchial muscle.

(c) *Specific Sensitizers.*—In considering specific sensitizers, it should be remembered that the inhalants are the most important subdivision of this group. House dust, orris root, epidermals (horse hair, cattle hair, cat hair, dog hair, feathers) and pollen form a formidable array of irritants for the allergic patient. Foods may not only cause asthma in people who are specifically sensitized to some protein constituent, but also indirectly, due to the formation during digestion of histamine or substances having a histamine-like action. This is prone to occur in persons with achlorhydria or hypochlorhydria. Bray found in a series of 200 asthmatic children that 80% had deficient secretion of hydrochloric acid. My own experience with adult asthmatics fully confirms this finding. Drugs may induce allergic symptoms, as is briefly discussed at the end of this paper. Bacterial infection in the bronchial tubes may be an aetiological factor at all ages. Injections of serum, bites and stings of insects do not play a prominent part in the causation of asthma.

(d) *Substances Acting Locally.*—Under the heading of substances acting locally histamine must be placed first. This amine is readily formed from the amino-acid histidine, and it is a very powerful constrictor of the bronchial tubes. The enzyme histaminase present in the body destroys this substance, so that it should reach the lungs in minimal quantities in the normal person, but it is possible that the activity of histaminase may be diminished in the asthmatic. Many immunologists think that histamine is liberated in the antigen-antibody reaction of anaphylaxis and probably also in the reactions associated with allergic disturbances. Tissue damage, particularly in the respiratory system, by liberating histamine may induce bronchiolar spasm.

(e) *Endocrine Secretions.*—Endocrine secretions play an important part in the regulation of the calibre of the bronchioles. Adrenaline stimulates the sympathetic nerve supply which is inhibitory to the bronchioles and causes bronchial dilatation. Some conceive intermittent deficiency in the secretion of adrenaline as a causative factor in the development of asthma. In support of this view we may note the low blood pressure usual in asthmatics; also many have a well-marked hypoglycemia. It is to be noted, however, that Addison's disease, with more or less complete destruction of the suprarenal glands, is not necessarily associated with asthma. The thyroid gland seems to have some indefinite relationship to asthma, and there is an association between the sex glands and allergic conditions. It is frequently found that during pregnancy asthma may be in abeyance, only to return after parturition. Occasionally pregnancy aggravates asthma. The relationship of allergy to other endocrine glands is indefinite.

#### *Diagnosis.*

The diagnosis of asthma and its cause depends on: (i) a carefully taken history; (ii) complete

physical examination of the patient; (iii) cutaneous tests, scratch and intradermal; (iv) a test meal; (v) an X ray examination of the chest, (vi) rhinological investigation, including antral lavage and X ray examination of the nasal sinuses; (vii) examination of the sputum.

As a rule there is little difficulty in diagnosing asthma, except perhaps in children, where it is not an uncommon error to confuse it with bronchitis. To determine the aetiological factor or factors, for there may be more than one, is much more difficult and requires full investigation by all means at our disposal. It cannot be too strongly emphasized that the history of the patient's illness is frequently an important guide to the cause of his asthma. One whose asthma follows closely upon whooping cough, influenza or other bacterial infection usually suffers from asthma of the infective type, and it is comparatively rare to obtain cutaneous reactions. The patient whose asthma occurs in the spring only and is associated with hay fever, is almost certainly sensitized to pollen; or again, a farmer who has attacks of asthma only when handling horses, is probably sensitized to horse dander. A rational interpretation of a detailed history is the first guide to diagnosis. The cutaneous tests have been criticized on the grounds that they so frequently yield no reaction. This has not been the writer's experience, for in testing a very large number of patients with allergic symptoms, cutaneous reactions were obtained in over 80%. The value of cutaneous tests largely rests on the judicious selection of a suitable series of testing agents of full potency.

#### *Treatment.*

The suggested forms of treatment are very numerous. It is seldom that the causative factors in two asthmatics are alike; hence each asthmatic has to be regarded as a separate problem, both from the aetiological and therapeutic standpoints. Table I summarizes some of the numerous therapeutic measures that have been adopted.

TABLE I.  
Showing Treatment of Asthma.

Prophylaxis.	Drugs.	Specific Desensitization.	Non-Specific Therapy.	Other Measures.
(a) Avoidance of known causes : Pollens. Foods. Feathers &cetera. (b) Use of allergen-free rooms.	Adrenaline. Ephedrin. "Ephetomin." "Eschatin." Atropine. Belladonna. Stramonium. Morphine. Iodides. Aspirin. Calcium chloride. "Afenil." Magnesium hyposulfite. Hydrochloric acid.	Pollen extracts. Epithelial extracts. Foods. Some bacterial vaccines.	Peptone. Tuberculin. "Edewell." "Campolon." Auto-hemotherapy. Some bacterial vaccines. Asthma powders. Sprays. Bowel wash-out.	Diet. X rays. Acetinotherapy. Diathermy. Psychotherapy. Exercise. Surgery. Change of climate.

*Avoidance of Known Causes.*—Avoidance of known causes is quite possible when the exciting factor is of local distribution. The patient can

avoid cosmos or sweet peas, whereas it is well nigh impossible to avoid the ubiquitous grass pollen in the spring months, except by taking a sea voyage. Mattresses containing an offending agent, such as kapok or horsehair, may be replaced by one containing wool or other material to which the patient is not sensitive. Many foods are readily excluded from the diet, whilst others, such as egg albumen and milk, form components of so many menus that it is difficult to prevent the unconscious ingestion of small quantities, sufficient in the sensitized patient to precipitate an allergic attack. The patient may be desensitized against such foods by the method of ingesting minute but increasing amounts. Allergen-free chambers containing air which has been filtered free from all allergic substances are in frequent use in hospitals and also in private homes in Europe, but have not become popular in Australia.

**Drugs.**—The use of adrenaline for acute asthma is now universal. If the patient is seen early in the attack, 0·12 to 0·3 mil (two to five minims) of a 1 in 1,000 solution injected hypodermically may be sufficient to dispel the dyspnoea, but a larger dose is frequently necessary. In very profound asthma 3·0 to 6·0 mils (50 to 100 minims) administered at the rate of 0·06 mil (a minim) every thirty seconds may be imperative to relieve the intense spasm. Intravenous injection of adrenaline is not desirable, as it may induce cardiac arrhythmia. Ephedrin is chemically closely related to adrenaline, but has the advantage that it is readily absorbed from the alimentary tract. Usually it is less efficacious for acute asthma than adrenaline, even though it be given hypodermically. "Ephetonin" is another proprietary preparation similar to ephedrin. The structure of ephedrin is such that six stereoisomers are possible. Of these, two occur in nature: dl-ephedrin, which is the ephedrin in current use, and d-pseudoephedrin. The dl-forms are optically inactive racemic mixtures. The preparation "Ephetonin" is such a synthetic drug of the nature dl-ephedrin. "Ephetonin" does not cause so many undesirable side effects as natural ephedrin, such as tachycardia, tremor, insomnia and nausea. For mild but more or less continuous asthma, ephedrin or "Ephetonin" has its greatest use because it can be administered orally and usually with considerable amelioration of symptoms. Adrenaline (0·3 to 0·6 mil or 5 to 10 minims) and ephedrin (0·03 grammie or half a grain) may be injected together hypodermically. The immediate but transient effect is obtained from adrenaline and more prolonged action from ephedrin. Those patients with frequent recurring asthma may be taught to give themselves an injection of adrenaline at the earliest indication of the onset of an attack. Cortical extracts of the suprarenal gland have in some instances been of value in the treatment of asthma, but the experience of such extracts is as yet very limited. Atropine, to be of much therapeutic value must be injected in large doses, 0·8 milligramme (one seventy-fifth of a grain) or even 1·3 milligrammes (one-fiftieth of a grain). If the asthma be due to vagal stimula-

tion, this drug may be effective, but if the allergic reaction is occurring in the muscle of the bronchial, atropine is usually of little value. Belladonna and stramonium have a limited use in the treatment of asthma. Morphine should not be used as a routine measure, but only in those patients whose response to adrenaline is unsatisfactory and who are in need of sleep. Full doses, 0·16 to 0·22 grammie (one-quarter to one-third of a grain), should usually be administered. Iodides serve a useful purpose in rendering the sputum less tenacious and more readily expectorated. Calcium, either as calcium chloride (5% solution) or "Afenil", a calcium-urea compound, injected intravenously may occasionally terminate acute or chronic asthma. These calcium compounds are, however, very unreliable in their therapeutic effect and should be used only if other measures fail. Magnesium hyposulphite has been strongly advocated by the French school of allergists and is worthy of a trial. In those patients with achlorhydria or hypochlorhydria, hydrochloric acid should be administered in full doses of 4·0 to 8·0 cubic centimetres (one to two drachms), well diluted with water, and taken with meals. This simple measure may have a very strikingly beneficial effect on the patient's well-being.

**Specific Desensitization.**—A similar procedure to that discussed when considering the treatment of hay fever is followed for desensitizing asthma patients with pollen extracts. The principles involved in desensitizing patients with epithelial extracts are the same as those concerned with the use of pollen solutions. Food may be given orally in minute but increasing quantities to those who show specific food sensitization. Specific sensitization to bacteria is uncommon, but, if it is demonstrated in an asthmatic, a vaccine is indicated. It is desirable that any septic focus, such as diseased tonsils, be first removed, but the site of infection may not be suitable for operative treatment, as in chronic bronchial disease, though this may be treated in some instances with the aid of the bronchoscope.

**Non-Specific Therapy.**—The development of a fixation abscess following the injection of turpentine, with its associated leucocytosis and rise in temperature, may cause marked amelioration of symptoms, which in some cases is permanent. Armour's peptone injected intravenously in 5% solution is widely used for non-specific desensitization, and there is some experimental evidence in support of the therapeutic claims made in its favour. "Edwenil" and "Campolon" have both been used and probably act in a similar way to peptone. Tuberculin was strongly advocated by the late Storm van Leeuwin, who had a wide experience of its use in his clinic at Leyden. It probably acts non-specifically, as in many of the cases in which it has been used with success there has been no evidence of tuberculous infection. Autohaemotherapy and autoserotherapy are of doubtful value. Non-specific bacterial vaccines are in most cases dis-

appointing and are worth a trial only if other measures fail. Inhalation of the fumes derived from the burning of asthma powders sometimes gives marked, though temporary, relief of the patient's dyspnoea, but the tiny particles of semi-combusted material which are also inhaled are liable to induce chronic bronchitis and ultimately more frequent attacks of asthma. A spray containing some combination of adrenaline, ephedrin, cocaine or "Novocain" at times relieves the asthmatic spasm. Cocaine is not desirable for frequent use, but there is no objection to the prolonged use of the other three drugs. Cameron, of Tunbridge Wells, strongly advocates washing out the colon daily with water, using several gallons at each wash-out. He considers asthma as being a toxemia largely of bowel origin.

**Other Measures.**—Certain general dietetic principles should be observed. It is wise for the asthmatic to partake of a small evening meal and no supper. Indigestible articles of diet should be avoided. Adams strongly advises the elimination of milk and milk puddings from the diet, even though the patient may not be sensitized to this food. The persons specifically sensitized to foods should avoid these or an attempt should be made at desensitization. Elimination diets were first suggested by Rowe for the diagnosis and treatment of cases of food allergy. It had been known for long that patients showing allergic reaction to food did not necessarily give positive skin tests. For these patients diets of the nature shown in Table II, constructed by Rowe, may be of use.

TABLE II.  
Elimination Diets (Rowe).

Type of Food.	Diet 1.	Diet 2.	Diet 3.	Diet 4.
Cereal ..	Rice.	Corn.	Rice.	Milk alone for the test period two to three quarts a day.
Bread ..	Rice biscuit.	Tapioca.	Rye.	
Meat ..	Lamb.	Corn pone.	Rye-rice.	
Vegetables ..	Lettuce.	Bacon.	Beef.	
	Spinach.	Chicken.		
	Carrots.	Asparagus.		
Fruits, jams, drinks ..	Lemon.	Squash.	Tomatoes.	
	Pears.	Artichokes.	Beets.	
	Peaches.		String beans.	
Miscellaneous	Sugar.	Pineapple.	Grapefruit.	
	Olive oil.	Apricot.	Pears.	
	Gelatin.	Prunes.	Peaches.	
	Cane syrup.	Sugar.	Sugar.	
		Corn oil.	Cottonseed oil.	
		Corn syrup.	Gelatin.	
			Maple syrup.	

Many asthmatic children are hypoglycaemic and the administration twice daily of two ounces of glucose dissolved in water and flavoured with orange or lemon juice frequently improves their asthma. The beneficial effect is usually more marked in quite young sufferers, and becomes progressively less with increasing age of the patient.

It is doubtful how the irradiations of X ray therapy act, but it may be due to stimulation of the suprarenal glands, with an increased output of adrenaline, or in those patients with enlarged tracheo-bronchial glands, a diminution of the size of the glands may be responsible for the improvement. Irradiation of the chest is the usual practice,

but the abdomen is also frequently included in the treatment. Ultra-violet therapy is of doubtful value in asthma, but diathermy is worthy of a trial in those asthmatics suffering from chronic bronchial infection. In some clinics diathermy has been used to induce hyperpyrexia in patients, but not with any striking improvement in their symptoms. Psychotherapy in selected cases may be beneficial.

Remedial exercises are necessary for those asthmatics whose thoracic muscles, through altered tone, have induced shrugged shoulders and barrel-shaped chests. The respiration in these patients is chiefly upper thoracic in type, and the diaphragm moves but little. Much of this disability can be corrected by exercises controlled by a skilled masseur. Occasionally brilliant results follow the surgical treatment of infected ethmoids, antra or sphenoidal sinuses in the asthmatic, but disappointment is frequent. Nasal abnormalities are not unusually the result of allergic reactions, and in these the allergic factor should be treated first and surgery should be used only if allergic treatment fails. Drainage or radical surgical treatment of grossly infected antra should almost invariably be performed.

Change of climate to a high altitude (4,000 or 5,000 feet or more) is usually associated with marked improvement in the patient's symptoms. Even an ascent in an aeroplane may dispel asthma. The precise reason for this is yet undecided. Some regard it as due to entering an allergen-free atmosphere, while others interpret it as due to pure meteorological changes. Apart from altitude, a clear, dry, sunny climate is desirable for the bronchitic type of asthma, the western Riverina in New South Wales being ideal in this respect, except in the hot summer months.

#### Other Allergic Conditions.

Time precludes detailed discussion this evening of other aspects of allergy, such as eczema, urticaria, angioneurotic oedema, migraine, muco-membranous colic, allergic purpura, serum reactions, bacterial allergy in relation to rheumatic infections and tuberculosis, and physical and drug allergy. I shall make only a few remarks concerning some of these.

#### Eczema.

Eczema exhibits three distinct stages of eruption, though all may be present in different areas simultaneously. The first stage is hyperæmia, the second the eruptive or exudative stage, characterized by papules, vesicles and pustules, while the third stage is desquamative. The lesions may be acute, subacute or chronic. It is probable that one-third to one-half of the cases of eczema are examples of allergy due to foods, animal epithelia, pollens, occupational irritants, silk and other cutaneous irritants. The diagnosis in this group depends on dermal, intradermal or patch tests, or the use of elimination diets. The full discussion of treatment of eczema, including the use of local applications and X ray treatment, is beyond the scope of the present address. Suffice it to say that removal of the cause

should be our chief object. In occupational eczemas this may be simple. By skin tests or elimination diets the causative factor may be determined and eliminated. Desensitization by injections is also employed and non-specific treatment, such as intravenous injection of peptone or autohaemotherapy, may be adopted.

*Urticaria and Angioneurotic Oedema (Giant Urticaria).*

Urticaria and angioneurotic oedema may be considered together. The former lesion occurs in the skin and the latter in the subcutaneous or submucous tissues. The causes may be alimentary, parasitic, drugs, physical agents, bacterial sensitization, as in chronic focal infections, or accompanying psychic states. With regard to the last mentioned cause, it should be noted that strong emotion may also cause urticaria to disappear, probably due to sympathetic stimulation with liberation of adrenaline. The treatment consists in local antipruritic lotions, the use of ephedrin or adrenaline, calcium and vitamin D, desensitization and non-specific measures, as outlined under the treatment of asthma.

*Migraine.*

There has accumulated considerable evidence that many cases of migraine have an allergic basis. It occurs with great frequency among members of allergic families, the same predisposing factors seem to operate as in other allergic conditions, and positive skin reactions often occur. In treatment, in addition to correction of eye strain and the administration of sedatives, such as "Luminal", many cases respond to treatment on the assumption that the underlying cause is allergic. Rowe reported eighty-six cases of migraine relieved on the basis of food allergy. Elimination diets and skin tests may frequently indicate the cause. Peptone administered intravenously may be of value and also the correction of hypochlorhydria or achlorhydria is indicated. Ephedrin frequently relieves migrainous headaches.

*Muco-Membranous Colic.*

Many observations indicate that muco-membranous colic is a disturbance comparable with asthma. No pathological changes have been noted in the wall of the colon. Paroxysmal attacks of colic with increased secretion of mucus by the colon occurring in patients with an allergic family history strongly suggests an allergic base for the condition. Hurst regards the syndrome as "asthma of the colon". The writer's own experience supports this view. Not only may spasm of colonic muscle occur in allergic conditions, but the small intestine may also be involved. It is important to realize that intense abdominal pain in such patients may simulate surgical conditions. If this possibility is remembered in allergic individuals, it may save the patient a needless abdominal exploratory operation. Treatment consists in removing the cause and in treating the condition symptomatically with ephedrin or adrenaline.

*Allergic Purpura.*

There are two main groups of purpura: (a) those due to changes in the capillaries, (b) those characterized by reduction in the number of blood platelets. Allergic purpura belongs to the former group. The symptoms may comprise: (i) gastro-intestinal disturbance with abdominal colic, vomiting, diarrhoea, and blood-stained faeces due to oedema, serous exudate or haemorrhage; (ii) swollen and painful joints with or without serous exudate or haemorrhage into the joint capsule, synovial membrane and periosteum; (iii) a variety of skin lesions, including urticaria, angioneurotic oedema and purpura. The blood platelets, blood coagulation time and clot retraction time are within normal limits. Alexander and Eyermann have described several cases in which food allergy was the aetiological factor. Elimination diets are very useful in determining the causative agent, and this may be excluded from the diet in future. Non-specific therapy may be indicated, whilst adrenaline and ephedrin are of value for symptomatic treatment.

*Drug Allergy.*

Landsteiner's experiments indicate that drug hypersensitivity depends not only on the specific drug, but on a combination of that chemical with the body proteins. This combination acts as an antigen and induces hypersensitivity. Aspirin, antipyrin, arsenic and quinine are the commonest of the drugs giving rise to these reactions. Skin tests are of little value in determining these allergens, as most drugs do not give positive skin tests. It has been the writer's experience that the worst form of asthma has been exhibited by patients sensitive to aspirin and also suffering from nasal sinus infection with polypi. In one such patient 0·15 grammes (two and a half grains) of aspirin almost proved fatal, and very large doses of adrenaline were necessary to overcome the intense bronchial spasm induced by the drug.

In conclusion we must view with considerable satisfaction the remarkable contributions to our knowledge of allergic diseases in recent years, and we may look to the future with confidence that the many unsolved problems of these disorders will yield to the researches of biochemists and immunologists.

**HEAT CRAMPS AND URÆMIC CRAMPS, WITH  
SPECIAL REFERENCE TO THEIR TREATMENT  
WITH SODIUM CHLORIDE.**

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*Heat Cramps.*

HEAT CRAMPS are seen from time to time among the manual workers of north Queensland, particularly the miners and the cane-cutters. The Mount Mulligan coal mine is situated in latitude 16° 51' south, at an elevation of 1,300 feet above sea level.

The workings are reached by a tunnel inclined downwards. In this latitude high temperatures are to be expected, especially from November to March. The ground temperature in the mine is 28.9° C. (84° F.). The air temperature in the workings varies with the temperature, humidity and volume of the entering air, and the position along the coal face. Sample readings are given in Table I. Their feature is the small margin between the wet bulb and dry bulb temperatures, indicating a high degree of saturation of the air. They may be compared with figures given by Moss,<sup>(1)</sup> who says that in England miners' cramp "has only been observed in hot mines where the temperature varies between 98° and 102° dry bulb and 83° and 87° wet bulb".

TABLE I.

*Wet and dry bulb temperatures (Fahrenheit) in the Mount Mulligan coal mine.*

Date.	Entering Air.		Bottom End of Face.		Top End. of Face.	
	Wet.	Dry.	Wet.	Dry.	Wet.	Dry.
March 14, 1931 ..			77	84	86	88
August 25, 1931 ..			76	81	84	88
April 28, 1932 ..	67	83	75	80	87.5	90

Heat cramps were an occasional complaint of the miners until a predecessor of mine, following Moss and Haldane's work, introduced the use of salt in the drinking water. Since then their incidence and severity have been greatly reduced. Most of the miners drink the salt water in the summer. Some use it intermittently. Some who do not use it are careful to limit the amount of water they drink. The following cases illustrate the efficacy of salt, both in prevention and treatment.

CASE I.—A., aged fifty-one years, has worked in the mine for twelve years. In the summer of 1929 he was working in a very hot place. He sweated profusely and drank water freely. A severe attack of cramps came on, and he had to be carried out of the mine on a trolley. At the hospital he was given a tumblerful of salt and water. The cramps took twenty to thirty minutes to pass off. From then on he took salt in his drinking water. He found that beef extract was a pleasant means of providing the salt. He had no more cramps until, the beef extract running out, he used cocoa instead. That day he had a tight feeling in his calves at the end of the shift, and cramps came on a few minutes after he reached home, lasting twenty minutes. Since then he has carefully kept to his salt and has had no more cramps in four years.

CASE II.—B., aged thirty years, had to cease work on November 24, 1931, because of cramps. They recurred several times as he walked up the incline of the main dip out of the mine. Further cramps occurred as he sat at the hospital telling his story. They caused him to writhe in pain. His mouth temperature was 35° C. (95° F.), his pulse rate 108, and his respiration rate 20 per minute. His urine was not tested. He was given a dessertspoonful of salt in a small glass of water. In less than three minutes the cramps had gone, and they did not recur, although he walked half a mile home straight away. This miner had been taking a small quantity of salt in his drinking water, but not nearly as much as the ten grammes to the gallon recommended by Moss.

The prompt response of the cramps to salt in these cases is in marked contrast to the course of several cases seen in 1927, before I became aware of their cause and treatment.

CASE III.—C., a Finn, aged forty-five years, was admitted to the Innisfail Hospital in the month of October, suffering severely from cramps in the back and limbs. He had been attacked while at work on the roads. His pain was relieved, but only partially, by several injections of morphine. The cramps continued for about twenty-four hours.

CASE IV.—D., aged about forty-eight years, a cane-cutter for fifteen years, consulted me because of muscular cramps that came on so frequently while he was cutting cane that he had been unable to work regularly for the past three years. He had an idea that they were connected in some way with what he drank. He had tried drinking oatmeal water and various concoctions recommended by his friends, but without avail. His bitterest lament was that he had even given up beer, and still got cramps.

Here are the experiences of four more miners:

CASE V.—E.'s case was similar to B.'s. His age was thirty years. Cramps forced him to leave work one day during February, 1932. They were still continuing at the hospital, and they ceased a few minutes after he took a dessert-spoonful of salt in water.

CASE VI.—F., aged fifty-six years, used to get cramps in his hands, feet and abdominal muscles. They also came on at home sometimes. After such an attack he would put salt in his drinking water for several days and intermittently at other times. On August 10, 1931, after a special muscular effort, he had cramps under the heart. He was not drinking salt water at the time.

CASE VII.—G., aged twenty years, always uses salt water. If he drinks plain water he sometimes gets a weak feeling in the abdomen. This never comes on while he is using salt.

CASE VIII.—H., aged forty-six years, never drinks salt water. He returned to work on January 8, 1934, after the holidays, during which he had drunk freely of alcoholic liquors. That day he developed a tightness under the sternum, and that night and the next he had cramps in the muscles of the calves. He did not feel able to work on January 9 or on January 10, when he first sought advice. He had never had an attack of cramps in the mine, but had similar nocturnal ones the previous summer. His urine at 11 a.m. on January 10 contained 0.8% chloride (estimated as chlorine).

The relation of this last man's cramps to his work is not clear. Moss's experience is that the cramps tend to occur in muscles while they are actually being strained. Nevertheless his story is interesting in view of the importance of acclimatization, and also Thorncroft's report<sup>(2)</sup> about steel smelters at Glasgow: "We have heard it freely stated among the men themselves that those who suffer from cramps are those who have had a big supply of alcoholic liquor the night before."

The miners described by Moss found that with the use of salt they not only lost their cramps but also suffered less from fatigue, and this experience was confirmed in the laboratory by Veale.<sup>(3)</sup> Many have since applied this observation with success to the reduction of the amount of fatigue in certain hot occupations; and I have often observed myself that lightly salted water is a much more refreshing and satisfying drink than plain water on a north Queensland summer day.

#### *The Mechanism of Production of Heat Cramps.*

Moss and Haldane have shown that miners' cramps are brought about by excessive sweating followed by the drinking of water. Their work is conveniently summarized by Brockbank.<sup>(4)</sup> The sweating leads to a great loss of water and salt from the body. As much as 8.1 kilograms (eighteen

pounds) of sweat, containing about 20.0 grammes of salt may be lost in a shift by a miner in a hot mine. The urine of a miner with cramps contains no chloride whatever. This means that his blood chloride content is much reduced. Sweating alone could not bring about this reduction; for sweat contains only about 0.2% sodium chloride, and sweating by itself would tend to concentrate salt in the blood. Thus Dill<sup>(5)</sup> found that exertion in the desert heat for an hour and three-quarters without drinking concentrated his serum chloride by 4.5%. There must be, in addition, the drinking of more water than is necessary to adjust the salt concentration in the blood. Haldane<sup>(6)</sup> adds: "The kidneys at the same time are out of action" (because of the deviation of blood to the muscles and skin), "so cannot deal with the excess diffusion pressure of water. The result is acute rise in the diffusion pressure of water or fall in the 'osmotic pressure'; and violent attacks of cramp are symptomatic of this."

Talbott and Michelson<sup>(7)</sup> have made a very thorough study of the blood and urine chemistry in patients with heat cramps. Their material was drawn from workers constructing the Hoover Dam, in the Colorado River Basin Desert, where the summer climate is extremely hot and dry. In the blood plasma they found a diminution in both the total base and the acid ions. The change was greater in the latter and was accounted for largely by the drop in the content of chlorides. The low values for chlorides seemed to them the most significant change. They go on to say:

Haldane predicted a lowering of the blood chlorides of 3 to 4 per cent. as a possible accompaniment of heat cramps. In this series the mildest case showed a 2 per cent. reduction in serum chlorides and the severest case a 10 per cent. reduction below the accepted normal minimal value . . . It is our belief that when a critical level for the chlorides is reached in working individuals muscle cramps will occur.

Their figures for four cases were 92.7, 99.0, 98.4, 96.1 milli-equivalents per litre.

These figures may be compared with those for plasma chloride in Addison's disease; for example: 70, 73 (Loeb<sup>(8)</sup>); 81, 95 (Harrop<sup>(9)</sup>). Although there is a much greater reduction in the chloride level, the state of the muscles in this disease is great weakness, not cramps. Perhaps if the muscles were forced to exert, they would cramp.

I had hoped to investigate in another way the rôle of the chloride ion by treating a patient with potassium chloride; but though this was kept in readiness through the next two summers, no cases of cramps occurred severe enough to be brought for immediate treatment.

The observations on acclimatization by Dill and his party<sup>(10)</sup> at the Hoover Dam are of much practical importance. They found that after going to the desert, where sweating was profuse and continued, the percentage of salt in sweat fell in the course of a few days to an average of 0.09. Thus salt is conserved, and heavy work with free sweating becomes possible in a tropical climate without undue salt loss or the necessity for a greatly abnormal

salt intake. For example, a man who sweated ten litres would only need to take about 15 grammes of salt. After acclimatization many workers are able to take with their meals all the salt that is necessary. This explains why cramps are not much more common. For the unacclimatized and those returning to hot work after a break, and those susceptible to cramps, further salt is required. It appears most logical to replace the salt as it is lost by drinking 0.1 to 0.25% saline solution. Another method is to take the salt in enteric coated tablets, each containing one gramme. The workers at the Hoover Dam were recommended to drink milk freely, for it contains 0.3% sodium chloride.

The relation of heat cramps to the other disorders produced by heat is briefly summarized in Table II.

TABLE II.  
Comparison of the essential features of the different disorders due to heat.

Condition.	Pathological Changes.	Clinical Features.	Treatment.
Heat cramps.	Loss of sodium chloride.	Cramps.	Salt and water by mouth. Perhaps hypertonic saline solution intravenously.
Heat exhaustion. Heat prostration.	Circulatory failure from insufficient blood volume.	Fainting, prostration, collapse. Skin cool, moist. Blood pressure low. Temperature subnormal or slightly elevated. Pulse small, soft.	Fluids, especially normal saline solution intravenously. General treatment for collapse.
Heat hyperpyrexia.	Failure of sweating.	Delirium, convulsions and coma. Skin dry, hot. Temperature 41.7° C. (107° F.) or more. Pulse rapid, full.	Cold water spray and fan.

#### Uraemic Cramps Relieved by Sodium Chloride.

CASE IX.—J., aged forty years, was first seen on June 11, 1932, in the terminal phase of a chronic nephritis. He had been suffering from cramps in the lower limbs for six months. They affected the thighs, calves and great toes, and occasionally the hands. They occurred mostly at night, perhaps several times in the one night, and caused him to get up and walk till they passed off. He was advised by his miner friends to take more salt. He took it by the spoonful at each meal, with the result that the cramps lessened, and the oedema of the face and ankles increased; for this he sought advice on June 11.

He had also had progressive shortness of breath for some time and nocturnal micturition for two years. His systolic blood pressure was 210 millimetres of mercury, and diastolic 150. The pulse rate was 96 per minute. The urine had a specific gravity of 1.013. It contained albumin (2.5 parts per mille, Esbach), numerous granular casts and occasional red blood cells. He was advised to reduce the salt intake. The oedema practically disappeared in a fortnight and the cramps returned. He found now that at night the cramps were in the lower limbs, but in the day time they caught him anywhere—back, hands, neck and muscles of the abdominal wall. They became more frequent and extremely painful; and to relieve them he was admitted to hospital on July 17. He stated that they were worse when he lay down, and that for several days he had been unable to lie down for more than ten minutes at a time because of them. His general condition

at this time was bad, and he could not walk more than ten yards without puffing.

While being examined he had two spasms of the left *flexor hallucis brevis* within five minutes. During the following night there were twelve severe cramps between 8 p.m. and 8 a.m., all in the left leg. He could not lie still when they came on, but had to get out of bed each time. He was given three injections of morphine through the night, each of 16 milligrammes. These sent him to sleep after each spasm was over, but did not relieve the pain of them, or apparently reduce their frequency. An experimental dose of two grammes of ammonium chloride at 10 p.m. also failed to improve them.

At 10.30 a.m. on July 18 he had a mild cramp. He was given sodium chloride in a dose of 1.3 grammes at 11 a.m., and again at 4.30 p.m. and 7.30 p.m. There were no more cramps that day or night. Next day, July 19, his muscles were aching and tender. He was free from cramps until 7.30 p.m., when mild ones began in the hands. There were two attacks in the night and six more between 8 a.m. and 10 a.m. on July 20. The sodium chloride was repeated at 12 noon, again at 9 p.m., after another cramp, and again at 9.30 a.m. on July 21 after some mild attacks in the arms and hands. There were no further cramps while he lived.

The blood urea content was 0.364% on July 18, and 0.420% on July 23. The circulation in his limbs was good. The feet were warm and the dorsal artery of each foot was felt to pulsate strongly, even during a painful spasm of the *extensor hallucis longus*. There was some bleeding each day from the nose and gums. Apart from the measured quantities of salt given, the amount of salt in his diet was restricted. Chloride was present in his urine every day, including the day of admission. On this day the right ankle puffed slightly on pressure, but not subsequently.

The cessation of cramps after the administration of salt on July 18 was striking. After the first dose of 1.3 grammes, the cramps, which had troubled him almost continuously night and day for several days, ceased. A total of four grammes being taken, cramps were absent for thirty-

three hours, and he obtained the first night's respite for three weeks. The time relation of the cramps to the administration of the sodium chloride is shown in Table III. The table also shows all other drugs given. None of them appears to have been responsible for the relief.

I have not found any mention in the literature of the relief of uraemic cramps in this way. While bearing in mind the danger of drawing conclusions from a single case, one may discuss the possible explanations of the actions of the sodium chloride in this case.

#### Discussion.

Spasms of muscles occur under a great variety of conditions. In their aetiology at least three biochemical phenomena are important: (i) reduction of the serum calcium content, (ii) alkalosis, (iii) deviation of chlorides. These phenomena are inter-dependent, and there are also muscular, nervous and circulatory factors.

#### The Serum Calcium Content.

A low value for the serum calcium content accompanies the tetanies of spasmophilia, rickets, osteomalacia, steatorrhœa and parathyreoid deficiency, and that following injection of sodium phosphate. And in those varieties of tetany where there is no reduction of the total serum calcium content, it is believed that there is a reduction of the ionized fraction. In uræmia the serum calcium content is usually low, and this is suggested as the explanation of the twitchings, cramps and convulsions that may accompany it.<sup>(11)(17)</sup>

TABLE III.  
Time relation of cramps to administration of sodium chloride and other drugs in Case IX.

Date.	Hour of Administration.	Drugs Given.	Occurrence of Cramps.	Blood Pressure in millimetres of mercury.	Fluid Intake for twenty-four hours in cubic centimetres.	Quantity of Urine passed in twenty-four hours in cubic centimetres.
July 17	8 p.m. 10 p.m. 10.30 p.m.	Morphine, 16 milligrammes. Ammonium chloride, 2 grammes. Morphine, 16 milligrammes.	Frequent through day. Twelve between 8 p.m. and 8 a.m.	190		
July 18	2.30 a.m. 11 a.m. 4.30 p.m. 4.30 p.m. 7.30 p.m.	Morphine, 16 milligrammes.  Sodium chloride, 1.3 grammes. Sodium chloride, 1.3 grammes. Phenobarbital, 65 milligrammes. Sodium chloride, 1.3 grammes.	10.30 a.m.  Two in night. Six between 8 a.m. and 10 a.m.	204-136 220-150		840
July 19	8.30 a.m. 1 p.m. 5.30 p.m.	Calcium lactate, 2 grammes. Calcium lactate, 2 grammes. Calcium lactate, 2 grammes.	7.30 p.m. Two in night. Six between 8 a.m. and 10 a.m.	196-130		960
July 20	8.30 a.m. 12 noon. 1 p.m. 5.30 p.m. 9 p.m. 9.30 p.m.	Calcium lactate, 2 grammes. Sodium chloride, 1.3 grammes. Calcium lactate, 2 grammes. Calcium lactate, 2 grammes. Sodium citrate, 2 grammes. Sodium chloride, 1.3 grammes. Soluble barbital, 0.5 gramme.	9 p.m.	202-132	1,980	425
July 21	8.30 a.m. 9.30 a.m. 1 p.m.	Calcium lactate, 2 grammes. Sodium citrate, 2 grammes. Sodium chloride, 1.3 grammes. Sodium citrate, 2 grammes.	9 a.m.	200-130	850	255
July 22	8 p.m.	Compound jalap powder, 4 grammes.		190-120	1,840	525
July 23	2 a.m. 3 a.m. 10.30 a.m. 4 p.m.	Aspirin, 0.6 gramme. Morphine, 10 milligrammes. Glucose intravenously. Ephedrine, 32 milligrammes.		180-120 140-100 144-86	570	170
July 24	4 a.m.	(Died.)				

*Alkalosis.*

Alkalosis is an important cause of tetany. It may be brought about by repeated vomiting, as with pyloric stenosis or intestinal obstruction, by overdosage with alkali, or by over-breathing. It would appear that a very slight change of the body's reaction to the alkaline side is sufficient to produce tetany. Thus McCance<sup>(12)</sup> has described two cases brought on by so little over-breathing that chemical changes in the blood and urine could hardly be estimated. Alkalosis is believed to impede the ionization of the calcium of the blood.

*Deviation of Chlorides.*

Loss of sodium chloride apparently represents another and distinct mechanism. Yet in many cases hypochloraemia is associated with alkalosis, and it may be that even when the chlorides lost are neutral, such a gross loss as occurs with some of these miners may upset the delicate acid-base balance sufficiently to induce muscle spasms. Talbott and Michelson found in their study of heat cramps that the acid ions were reduced more than the basic ones. Conversely, it has been suggested that the main cause of the symptoms in alkalosis is the associated hypochloraemia.<sup>(13)</sup>

In my case of uremia it is possible that the serum calcium content was low and that the reduction explains the cramps. The estimation was unfortunately not made. This does not help, however, in explaining their relief with sodium chloride. One is reminded that the spasms of infantile tetany, in which the serum calcium content is low, are quickly relieved by ammonium chloride, and the serum calcium content simultaneously rises.<sup>(14)</sup> But the mechanism cannot be the same in my case, for sodium chloride was effective after ammonium chloride had failed.

There was clearly no alkalosis in this case. The urine was acid throughout, there was dyspnoea at rest, and the cramps were not relieved by ammonium chloride. De Wesselow<sup>(15)</sup> has frequently found extreme hypochloraemia in severe uremia and says that in his experience it is invariably associated with vomiting. My patient is recorded to have vomited only once in hospital, on July 19. The presence of chlorides in his urine on admission is evidence against any marked degree of hypochloraemia. No adequate explanation can therefore be offered of the action of the sodium chloride in this case. One falls back in general terms on a "disturbance of chloride equilibrium."

Finally, what other varieties of muscle spasm may be attributed to a disturbance of the chloride equilibrium? Clearly of this type are the cramps that may occur in *diabetes insipidus* after an injection of pituitrin, if the water intake has not been previously reduced,<sup>(11)(16)</sup> and probably those of cholera, and perhaps those of persistent vomiting, although in these the picture is complicated by the additional factor of alkalosis. It is likely that the cases of tetany described in the course of infectious diseases are due to insufficient salt in the diet, aided in pneumonia by the salt deviation to the lungs.

And the following case histories, though incomplete, are suggestive.

**CASE X.**—K., a little girl, aged three and a half years, had five or six painful cramps in the foot on the afternoon of the third day of an attack of influenza. The mother said that the toes were turned up each time. The urine next morning contained less than 0.1% of chloride (estimated as chlorine).

**CASE XI.**—L., a woman, aged thirty-nine years, with essential hypertension, had an average systolic blood pressure of 230 millimetres of mercury and a diastolic pressure of 120. Following out instructions she reduced her salt intake as much as possible. Soon after she developed mild but frequent cramps in the muscles of the jaw and forearm.

**Conclusions.**

The efficacy of sodium chloride in the prevention and treatment of heat cramps is confirmed by experience among miners and others in north Queensland.

A case of uremia with cramps is described, in which the cramps were relieved by sodium chloride. Cramps are not common in uremia, but when they occur they may be extremely distressing. In such cases this simple treatment is worth trying.

It is suggested that disturbance of the chloride metabolism may be the cause of still other varieties of cramp.

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## The Medical Journal of Australia

SATURDAY, NOVEMBER 10, 1934.

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### LOCAL MEDICAL ASSOCIATIONS AND BRANCH SUBDIVISIONS.

THE activities of the British Medical Association are of two kinds, scientific and medico-political. The scientific activities are, of course, the more important; they are given pride of place in the stated objects of the Association. It is well that this should be, for if the medical profession as a collective body becomes apathetic in its search for the cause of disease, if it fails to pursue prevention with all its resources and to look on treatment as a means of curing the patient and not of replenishing its own coffers, it will surely fall from its high estate and degenerate. This does not mean that the medico-political side of medical practice should be neglected. On the contrary, it requires much attention, but this attention must take a second place. The medical practitioner, like any other worker in the community, believes that the labourer is worthy of his hire; and without doubt a harassed or exploited medical profession cannot give to the community the service that it is entitled to receive.

The affairs of the Branches of the British Medical Association are managed by councils elected from amongst its members. The councils have to organize the scientific activities of the Branches and they have, on the medico-political side, to act as organizers and mediators in problems connected with practice that would tax the ingenuity and try the patience of a Solomon or a Job. Practitioners who are inclined to grumble at Branch councils would do well to consider the immensity of the task that Branch officials have to face. As one example may be mentioned the statement by a recent Branch president that in his term of office of one year he had to attend no less than one hundred and fifty-six meetings connected with Branch affairs at which his presence was required. If members of the Branches knew the full extent of the work that is undertaken on their behalf, they would probably be less inclined to grumble and more anxious to lend their cooperation.

In most of the States the organization of the medical profession includes bodies that are subsidiary to the Branches of the British Medical Association. In Queensland what are known as local medical associations are affiliated to the Branch. The same bodies exist in New South Wales (New South Wales first adopted the expedient). Western Australia also has local associations. In Victoria what are known as subdivisions of the Branch have been formed. In Tasmania local conditions were met by the formation of a northern subdivision that is a live and active body. In South Australia it has not been deemed necessary to institute subsidiary bodies. Subdivisions are in a somewhat different category from local medical associations, for all members of the Branch belong to the subdivision. Medical practitioners resident in an area who are members of the Branch may or may not join the local medical association, as they think fit. Certain of the local medical associations do not include all practitioners resident in the district who are eligible for membership. It is at their request that attention is now drawn to the advantages likely to accrue to members of the Branch who join these bodies. The first and most important point is that at meetings of a local

association practitioners in the district meet one another and, by rubbing shoulders, are likely to understand one another better and to avoid the foolish quarrels that mar so many of the relations between practitioners. This, of itself, should be sufficient to induce all Branch members to throw in their lot with those of their fellows. It is, of course, true that prejudices often play a part in preventing perfect harmony. Graduates from overseas often feel this. Sometimes it is their own fault, sometimes the hand of fellowship is not held out to them. Again, practitioners who have indulged in what is known as squatting may also feel estranged. These are matters that can best be mended by the officials of the association, who should go out of their way to welcome the newcomer and make him or her feel at home. At many local associations medical papers are read, and in our opinion this custom should be more widely adopted. A great deal of the work of the local association, however, is given up to the medico-political aspect of practice. Many questions of local interest can be discussed and difficulties can be overcome. Most important of all is the liaison that exists between the Branch councils and the local associations. The councils almost invariably refer to the local associations matters that concern their members; members have an opportunity of expressing their opinions and of influencing the Branch decisions. We may go so far as to state that when an important question affecting medical practice has been referred by a Branch council to the local associations, the practitioner who does not choose to belong to the local association has no right to complain if the decision finally put into effect does not suit his ideas of what should be done.

In concluding this appeal to members to join the local association of their district, to take an active part in its deliberations, and thus to cooperate with the Branch council, we would once again emphasize the importance of sinking individual differences and of ceding even to the most doughty opponents the possibility that an apparently untenable opinion has been formed by honest conviction. This will lead to greater understanding, and with perfect understanding almost anything may be achieved.

## Current Comment.

### REGIONAL DISSOCIATIONS IN BLOOD PRESSURE.

THE sphygmomanometer is a useful instrument, provided its limitations are appreciated. It furnishes valuable information concerning the condition of the circulation, but it does not tell the whole story of the vascular condition. The veins and capillaries have conditions peculiar to each. The blood pressures in the two arms not infrequently differ. The retinal artery on ophthalmoscopic examination may not conform to the findings of the brachial artery. Subsidiary vasomotor centres throughout the body have been postulated. Localized vasomotor spasm might help in explaining temporary hemiparesis or aphasia, as well as the hemianopia or scintillating scotoma of migraine, and possibly might have some bearing on the distressing manifestations of Ménière's vertigo.

M. Villaret, L. Justin-Besançon and R. Cachera<sup>1</sup> are of opinion that the cardio-vascular system is decentralized and that facts support the idea of the existence of relative autonomy of the several circulatory sectors and their mutual independence, allowing simultaneous regional conditions to occur in which the blood pressure is very different both in the arteries and veins. A regional division (local or visceral) of vascular action must be accepted. These differences or oppositions and inequalities Villaret has termed "circulatory anisergy". The phenomena of anisergy were shown by Villaret and his co-workers in graphs simultaneously recording (in dogs) the arterial pressures in different regions; also by comparing variations in arterial pressure with concomitant variations in the calibre of a visceral artery (such as the retinal); and also by comparing tracings of arterial and venous pressures. Variations in general arterial pressure, as recorded at the central end of an artery, were compared with those occurring simultaneously in recurrent arterial pressure. This recurrent pressure is obtained by a cannula placed in the peripheral end of an artery. The cannula, connected with a kymograph, measures the blood pressure maintained in the peripheral part of the limb through the anastomoses. This local pressure reflects mainly the peripheral vasomotor actions present and also other conditions, as it communicates, by the anastomoses, with the general pressure on which it must, to some extent, depend. All modifications in the recurrent pressure which are relatively greater than the simultaneous general arterial pressure, or which occur apart from variations in the general pressure, or which are inversely related to variations in the general pressure, must be due to local vasomotor action. Villaret observed differences and dissociations in regional variations in arterial pressure. During constriction and dilatation of the peripheral vessels induced by suitable agents the recurrent pressure rose or fell in a degree out of proportion to the

<sup>1</sup> *The Lancet*, September 1, 1934.

fluctuations in the general pressure. It may be urged that an agent stimulating peripheral vaso-motor action should modify peripheral pressure first and principally, and the general pressure secondarily and in minor degree. But Villaret claims to have shown that it is possible to vary the recurrent and general pressures in relation to each other in differing ways, according to the dose of the agent and the manner of introducing it. Ophthalmoscopic examination of the retinal artery was associated with a record of the general arterial pressure, and it was shown that the state of dilatation of this artery is relatively independent of the general arterial blood pressure, whether high or low. In man a suitable injection of acetylcholine dilates the retinal artery, even in the absence of any fall of general pressure. In a further series of studies in dogs Villaret examined comparatively variations in venous, general arterial and recurrent pressure under different influences and recorded simultaneously. Extreme freedom was shown to exist in reciprocal variations in venous and arterial pressures which may be totally independent of each other. Adrenaline either raises venous pressure or leaves it unaltered, according to whether the vagi are intact or divided. But the general arterial and recurrent pressures are raised in all cases. The administration of atropine had the same effect as vaginal section.

The causation of pressure variations is complex. Venous pressure is closely related to cardiac output. Whatever the precise mechanism of such variations may be, and peripheral vascular factors may not be the only factors, it is shown that arterial and venous pressures may be mutually independent. The return circulation is relatively autonomous. In clinical practice examination of the heart and its functional condition as well as estimations of the blood pressure are valuable; but such factors do not give all the necessary data, and the measurement of peripheral venous pressure is important. The clinical applications of the knowledge of regional dissociations are of the highest importance. Erythromelalgia and Raynaud's syndrome may be thus capable of explanation. Deep and visceral vascular spasm, limited to restricted areas, is more difficult to recognize, but is becoming more widely known. Lead colic may be an effect of local hypertension not affecting the general blood pressure. Spasm limited to the cerebral arteries may cause motor effects, either of deficiency or stimulation. Recorded cases show the rôle of localized vascular spasm in producing subpermanent epileptic seizures and they indicate the possibility of abolishing the spasm by acetylcholine. Possibly anisergy in the greater or lesser circulation may explain some forms of pulmonary oedema or infarct, as well as some cases of cardiac failure and syncope. Villaret truly observes that the pressure in a large artery of the limb does not indicate the general state of the circulation and that findings in one part of the body do not apply to the whole. The pressure recorded in the brachial artery does not indicate the pressure in a visceral

territory or even in the digital arteries. The studies of Villaret and his colleagues demonstrate the relative independence of function in the different elements of the circulatory system and reveal this system as a highly complex whole, the constituent parts of which operate diversely.

These studies give much food for thought and help to explain the mechanism of some obscure conditions, even though they do not reveal the essential causes of such deviations from normal.

#### ACCIDENTAL INOCULATION OF LEPROSY.

THE accidental inoculation of a human being with leprosy is a rarity. Many attempts have been made to transmit leprosy to the lower animals and almost without exception the attempts have met with failure. A recent report by E. Marchoux, of the Pasteur Institute, is therefore of considerable interest.<sup>1</sup> The report is interesting, not only from the scientific point of view, but on account of the warning that it carries to medical practitioners who have to investigate leprous infections. In December, 1922, Marchoux was removing, for purposes of study, a leprotic nodule from the arm of a patient who was in the clinic of Professor Jeanselme, of Paris. The needle used for closing the wound was blunt and when it was forced through the skin of the patient it pricked an assistant on the external surface of the right middle finger. The wound was slight and superficial. The wound was made to bleed, some iodine was forced into it, and it was burned with a thermo-cautery. In view of the many unsuccessful results in the experimental inoculation of leprosy reported in the literature, no great anxiety was felt. Moreover, Marchoux himself had some considerable time before experienced a more serious and somewhat similar accident without ill-effect. In March, 1932, the injured person, who had in the meantime become a distinguished physician, reported that two years previously he had had "a suppurative onyxitis with loss of the nails of the median and index fingers. Six months previously, that is, eighteen months after the occurrence of the onyxitis, he noticed that a cigarette burn was painless; the anaesthesia affected both the index and middle fingers. Between the index finger and the thumb, and extending on to the back of the hand, was a slightly violaceous area limited by a more reddish border. In a small piece removed for examination numerous acid-fast bacilli were found. Sections confirmed the diagnosis of leprosy. Shortly afterwards the patient died from a suppurating congenital hydronephrosis. Marchoux points out that the original wound, being in the dermis, had the greatest chance of causing an infection. Infection was also in all probability favoured by lowered resistance; the lowered resistance was brought about by the condition that finally caused death and by a restricted diet taken by the patient to combat his obesity.

<sup>1</sup> *The International Journal of Leprosy*. January-March, 1934.

## Abstracts from Current Medical Literature.

### RADIOLOGY.

#### Observations of the Colon in Amoebic Dysentery.

KANE IKEDA (*Radiology*, May, 1934) states that the cysts of *Entamoeba histolytica* are carried down into the caecum before they become activated into the protozoan form. The normal alkaline reaction of the flora of the colon and the natural reservoir-like behaviour of the caecum appears to favour the multiplication of the liberated amoeba and the development of the first lesions in this portion of the colon. It is likely that the majority of the cases diagnosed and treated early may escape without further involvement than the caecum and the proximal portion of the ascending colon. The rectum, another dilated reservoir, is the second common site of involvement, followed by the adjacent sigmoid. No appreciable changes are noted radiologically in the early stage of infection. Later, fine saw-tooth projections may develop along the wall, which probably represent small superficial ulcers and which may soon become obliterated by inflammatory oedema and exudation. Fine feathery or thorny filling defects on the indurated wall probably signify a later stage of the same lesion in which the submucosa and muscularis are involved in an extensive inflammatory granulation process. A somewhat characteristic deformity of the caecum and ascending colon is observed during the subacute or early chronic stage of the disease, when there may be an apparent shortening or constriction of the wall, with induration and filling defects in varying degrees. These changes are rapidly eradicated by the institution of emetic treatment. An advanced amoebic lesion, when diffuse and extensive, is not likely to be confused with cancer, but when localized and obstructive the differentiation may be impossible.

#### Lumbo-Sacral Anomalies.

ALBERT B. FERGUSON (*Radiology*, May, 1934) states that stability, or sound mechanics, at the lumbo-sacral area depends in a great degree on the lumbo-sacral arch articulations. The most stable condition is present when the facets are of the internal-external type, that is, when the joint is in the sagittal plane. In the skiagram such a joint shows clearly, as the plane of the joint corresponds with the plane of the antero-posterior view. There may be variations from this type in many ways: the facets may incline laterally; they may be rudimentary, irregular, defective, or in various planes from the sagittal to the transverse. The latter type are called antero-posterior facets and are unstable in that they allow an undue amount of motion at the lumbo-sacral joint. Probably the worst type of

facets, considered mechanically, are those which are asymmetrical. There is severe asymmetry when one facet is internal-external and the other antero-posterior. With such a mechanism every motion must put undue strain on one or the other of these facets, as they do not operate in the same plane. Practically every person with a severe degree of asymmetry of these facets has symptoms referable to the lower part of the back. Transitional formation may be present in any degree from slight enlargement of the transverse process to pseudoarthrosis or even complete fusion to the sacral wing. At the false joint there are periosteum and fibrous tissue, pressure upon which is painful. Motion produces such pressure, and if the motion is sufficiently sudden there is a contusion, with effusion or haemorrhage attempting to occupy the negligible space between the bony processes. There is then constant pressure till the swelling subsides. In this stage any motion is a further irritant and hence a chronic painful condition may result. Radiation of pain in this anomaly may be bilateral or unilateral and may be to either the right or left side, regardless of which side exhibits the anomaly.

#### X Ray Findings in Malignant Tumours of the Naso-Pharynx.

GUNNAR JONSSON (*Acta Radiologica*, February, 1934) describes the technique for demonstrating tumours of the naso-pharynx. The contours of the naso-pharynx and pharynx often show up extremely well on axial and lateral views. In an axial view tumours from the lateral walls of the naso-pharynx show up especially well, while on a lateral film tumours from the roof and posterior wall are seen best. All these tumours are visible as soft shadows bulging into the air-filled lumen. Besides the soft tissue mass, areas of destruction can be demonstrated in the base of the skull. The patient should put the tongue out during the exposure, and in order to increase the size of the air-filled cavity should force air up into the upper air passages while keeping his mouth and nostrils closed.

#### Radiography and Chronic Appendicitis.

THOMAS SCHOLZ (*American Journal of Roentgenology*, June, 1934) evaluating the many different Röntgen signs of a pathological appendix, states that local tenderness as elicited by palpation over the Röntgenoscopically visualized appendix or appendix region is the only reliable diagnostic sign of appendicitis, and it enables one to make a definitely correct diagnosis in approximately 90% of cases. Absence of appendiceal tenderness does not exclude the presence of an appendix lesion. It only means that at the time of the examination there was in the appendix no actual inflammatory process. It is therefore important that the X ray examination be made during the period of symptoms or be repeated on the recurrence of the attack. Out-

side of local tenderness none of the directly or indirectly obtained Röntgen evidences which hitherto have been considered to indicate appendicitis have any diagnostic value, since they do not occur much more often in definitely proved appendicitis than in other abdominal conditions or in clinically normal appendices. On the contrary, some of these signs, like caecal and appendiceal stasis and spastic phenomena, occur more frequently in non-appendicitis cases. Especially is appendiceal retention useless as a diagnostic sign; in some of the author's clinically normal appendices it persisted for eight to twelve days.

#### Extensive Calcification of the Kidneys in Osteitis Fibrosa Cystica.

ALICE ETTINGER and HEINZ MAZENDANTZ (*American Journal of Roentgenology*, May, 1934) report a case of *osteitis fibrosa cystica* in which an early diagnosis was possible before clinical evidence of bony changes was obvious. There was X ray evidence of extensive parenchymatous calcification of both kidneys, the clinical findings in the kidneys being those of a peculiar form of hematogenous kidney disease. The diagnosis of parathyreoid adenoma was proved by operation and the tumour was successfully removed.

#### Duodenitis and its Röntgenological Characteristics.

B. R. KIRKLIN (*American Journal of Roentgenology*, May, 1934) describes the Röntgenological manifestations of duodenitis. First in importance among the signs is abnormally increased irritability of the duodenum, although this varies considerably in degree and does not necessarily bear a direct ratio to the severity of the duodenitis. In typical instances the hyperirritability is manifested in intense spasticity and hypermotility of the duodenum. The barium races through so rapidly that there is scant opportunity to inspect the shadow. The bulb frequently is small and grossly deformed, both on its medial and lateral borders, and the configuration of the deformity varies quickly from moment to moment. Further, the bulbar shadow lacks the density commonly seen in cases of frank ulcer; it is thin and indistinct, and its margins are hazy. A second characteristic is the unusual pattern, which is coarsely and irregularly reticular and is depicted as translucent islets lying in a dense network. This appearance is perhaps attributable to puckering of the mucosa by spastic contractions of its muscularis. A third characteristic of simple duodenitis is the absence of an ulcer crater. Neither marginal niche nor persistent central fleck can be seen. Almost invariably there is an absence of any delay in the emptying of the stomach, since duodenitis does not tend to produce organic stenosis. Completing the typical Röntgenological syndrome of duodenitis is a small hypertonic stomach with active, sometimes disordered, peristalsis.

## PHYSICAL THERAPY.

## Bronchiogenic Cancer: Treatment with X Rays.

B. M. FRIEND (*The American Journal of Cancer*, April, 1934) cites two cases of bronchiogenic cancer, of seven and of two years' duration respectively since onset of symptoms, which were treated by X rays with no appreciable response. The disease had reached an advanced stage when the radiologist was consulted, and treatment was instituted merely as a palliative measure and to improve the patient's morale. A cursory survey of the literature, with particular reference to radiotherapy of primary carcinoma of the lungs, revealed very meagre material on the subject. The author stresses that microscopic studies of early neoplasms should be made prior to initiating treatment; that the results obtained should be gauged by changes in the size of the tumour, by a lasting systemic improvement (for temporary improvement often occurs spontaneously in cancer, as in other chronic diseases), and by the period of survival as a result of the applied therapy. Incidentally Case I showed diffuse deposits of calcium, interpreted as "calcium metastases" in the lung affected by cancer.

## The Minimal Electrical Stimulus in Exophthalmic Goitre.

D. W. C. NORTHFIELD (*Guy's Hospital Reports*, January, 1934) reaffirms the fact that the incidence of tetany as a post-operative complication of primary Graves's disease is extremely variable and varies in different clinics from 1 in 2,000 to as much as 3% or 4%. An attempt has been made to determine the electrical excitability of patients before they develop frank tetany. The test is used by means of a galvanic current. The same muscle (*brachio-radialis*) is chosen for all tests and the conditions of temperature and moisture of the skin which affect the contact of the electrodes are constant. The weakest current which will evoke a muscular contraction is then estimated. During the years 1929 to 1931 this test was performed in forty-one cases. The extremes of current necessary to cause contraction were from 0.4 to 4.0 milliamperes. Only one patient developed tetany following operation. In this patient the pre-operative stimulus was 0.6 millampere and the tetany was successfully treated by parathormone and calcium. At subsequent dates the test was 2.7 milliamperes, and finally 3.0 milliamperes. In conclusion the author summarizes as follows: In exophthalmic goitre there is a marked diminution in the minimal electrical threshold stimulus of peripheral nerves. This diminished threshold for electrical stimulation is much improved by operation. In a young patient with a rapid history a low figure is to be expected and is an indication in some measure of the severity of the disease. A low post-

operative figure is some indication that further treatment may yet be necessary. When the disease has existed for a long time before relief is sought, this figure will probably remain less than normal. A markedly low threshold (in the region of 0.6 millampere) is evidence of latent tetany and may lead to post-operative frank tetany. Hyperpnoea and pyrexia are considered to be the chief primary factors in producing latent tetany. Therefore the alleviation of the former by complete rest and of the latter by adequate methods of cooling are the best means of preventing the post-operative tetany.

## Results of the Treatment of Uterine Cancer in Denmark.

K. F. B. BUSCH (*Acta Radiologica*, February 15, 1934) presents a statistical report of the cases of uterine and vaginal cancer treated at the Radium Centre in Aarhus, Denmark, during the period 1914 to 1931. He divides his statistics into two parts, the material with five years' observation being analysed in detail, according to the rules of Winther, while the more general information takes in all of the cases extending beyond the period. For the sake of comparison he gives the corresponding statistical figures from Munich. In Aarhus the absolute cure rate for the four stages of carcinoma of the cervix together is 17%, and in Munich 18.2%. For cancer of the body the absolute cure rate is 40% for both centres. The treatment carried out at Aarhus for cervical carcinoma is to insert radium in tubes into the uterine cavity and radium in capsules are applied against the *portio vaginalis*. This is repeated after ten days. The precaution is taken to have abundant tamponage towards the rectum to avoid the unpleasant rectal sequelae. Three thousand milligramme-hours are given in the uterus and 4,000 milligramme-hours in the vagina. One month later deep X rays are commenced, 1,000 r over each parametrium through one millimetre of copper and one millimetre of aluminium at 160 kilovolts. The dose is given in five sittings.

## Medical Diathermy in Prostatitis and Seminal Vesiculitis.

A. E. JONES (*Archives of Physical Therapy, X-Ray, and Radium*, July, 1934) suggests that diathermy offers a middle course between surgery and palliative treatment in prostatitis and seminal vesiculitis. The only drawback which can be cited against diathermy in the therapy of these pathological states is the amount of time which must be spent in its application. The author found that unless the patient receives the diathermic current for at least thirty minutes much improvement cannot be expected. The patient is placed in the dorsal position and the rectal electrode is lubricated and introduced very slowly until the metal surface comes in direct contact with the point

of greatest tenderness. The mistake is often made of applying too much heat, so that instead of stimulating the defensive forces they are inhibited. During the past ten years 210 cases of chronic prostatitis and seminal vesiculitis have been treated by diathermy alone or by diathermy in combination with protein therapy. Of the entire series of patients 78% are listed as having obtained a definite clinical cure. This is taken to mean complete relief of all subjective symptoms with the urine clear on repeated examination. In addition, 28 patients, or approximately 13% showed a marked improvement from the standpoint of relief of the most distressing symptoms with a reduction of the bacterial count in the urine, although the urine was not wholly free from pus when the treatment was discontinued. Eighteen patients, or about 9%, showed no definite improvement, either symptomatically or in clarification of the urinary sediment.

## Carcinoma of the Lip.

BERNARD P. WIDMAN (*The American Journal of Roentgenology and Radium Therapy*, August, 1934) analyses the results of the radiation treatment of 168 cases of cancer of the lip. Of 125 patients without node enlargement at the beginning of treatment, 78, or 62%, are symptom-free one to ten years or more. These results are based on all cases without respect to size. For lesions about one centimetre in diameter the curability range is greater than 90%. With prophylactic irradiation of the lymph nodes of the neck subsequent development of cervical node metastases occurred in 17% of 52 cases, as against 51% of 72 cases that developed uncontrollable cervical node metastases without prophylactic irradiation. There is evidence to indicate that the best results are obtained in small lesions, one centimetre in diameter or less, and with adequate treatment of lesions of short duration.

## Röntgen Therapy in Dermatology.

JOSEPH JORDON ELLER (*The American Journal of Roentgenology and Radium Therapy*, August, 1934) recommends Grenz rays (X rays generated at eight to ten kilovolts) in the treatment of multiple flat epitheliomas, *verruca plana*, localized neuro-dermatitis, eczema of the scalp, eyebrows and eyelids, dermatophytosis, sarcoids and *lupus vulgaris*. He states that they are of no value in angioma, *acne rosacea* or psoriasis. In *acne vulgaris* systemic and local treatment is necessary; 85r once weekly of unfiltered X rays are given. In *mycosis fungoides* the X ray result is spectacular for the time being. Hyperhidrosis is treated by five doses of X rays through one millimetre of aluminium at intervals of ten days in one-quarter of the skin tolerance dose. Other skin diseases discussed are rosacea, dermatophytoses, *lichen planus*, *tinea capitis* and *favus*, *pityriasis rosea* and furuncles.

## British Medical Association News.

### MEDICO-POLITICAL.

#### ANNUAL MEETING OF THE DELEGATES OF THE AFFILIATED LOCAL ASSOCIATIONS OF MEMBERS WITH THE COUNCIL OF THE NEW SOUTH WALES BRANCH OF THE BRITISH MEDICAL ASSOCIATION.

THE annual meeting of the delegates of the Local Associations affiliated with the New South Wales Branch of the British Medical Association was held at the British Medical Association House, 135, Macquarie Street, Sydney, on September 28, 1934, Dr. A. J. COLLINS, the President, in the chair.

The following delegates were present: Dr. Kevin Byrne (Canterbury-Bankstown Medical Association), Dr. A. T. Roberts (Central Northern Medical Association), Dr. G. A. Buchanan (Central Southern Medical Association), Dr. K. S. M. Brown (Central Western Medical Association), Dr. L. R. Flynn (City Medical Association), Dr. R. C. Traill (Eastern Suburbs Medical Association), Dr. A. C. Thomas (Illawarra Suburbs Medical Association), Dr. B. G. Wade (Kuring-gai Medical Association), Dr. A. G. Brydon (Northern District Medical Association), Dr. R. V. Graham (North-Eastern Medical Association), Dr. J. Kerr (South-Eastern Medical Association), Dr. W. F. D. La Touche (South Sydney Medical Association), Dr. E. A. Tivey (Warringah Medical Association), Dr. W. H. Donald (Western Suburbs Medical Association).

The following members of the Council were present: Dr. G. M. Barron, Dr. A. M. Davidson, Dr. L. A. Dey, Dr. J. A. Dick, Dr. A. J. Gibson, Dr. Hugh Hunter, Dr. W. K. Ingilis, Dr. C. H. E. Lawes, Dr. W. F. Simmons, Dr. Kenneth Smith, Dr. E. H. M. Stephen, Dr. W. Vickers.

Dr. J. G. Hunter, Medical Secretary of the New South Wales Branch, was present.

Apologies were received from Dr. Mervyn Archdall, Dr. George Bell, Dr. C. B. Blackburn and Dr. A. W. Holmes à Court.

#### Welcome of Delegates.

Dr. A. J. Collins, as President of the New South Wales Branch of the British Medical Association, welcomed the delegates. He said that he was pleased to see such a large and representative gathering, and he was looking forward to hear what the delegates had to say. Since the last meeting of delegates there had appeared in the Press reports of statements made by the Minister for Health, containing animadversions against the medical profession as a whole. Possibly the Minister had not been accurately or fully reported. The Council of the Branch had written to the Minister for Health, pointing out that some of his statements had given great pain to members of the medical profession, many of whom had made considerable sacrifices in the course of their public duties. Dr. Collins had then had an interview with the Minister for Health and had invited him to attend a Council meeting. This had eventually been arranged, and as a result of the meeting it was clear that the Minister's attitude was just as it could be wished to be. It appeared, however, that the Minister for Health had justifiable cause for complaint. He stated that he had documentary evidence to show that medical practitioners in certain parts of the country were charging patients fees for treatment in public wards. This was against the law and the Minister was determined to prosecute. Dr. Collins thought that this was a good opportunity to tell the delegates to make known these facts to men who were not properly informed in the law. He wished to appeal to the delegates from remote parts to plead with the members of their Local Associations to carry out their duties in public hospitals strictly in accordance with the *Public Hospitals Act*. He realized that there was great confusion concerning intermediate beds in public hospitals. Mr. Love, a former Chairman of the

Hospitals Commission, had informed the Branch that the screening of a bed in a public ward would be sufficient if the bed was required as an intermediate bed; but the Minister for Health did not agree with this. He had mentioned a town in New South Wales in which there were only one medical practitioner and only one hospital, where all the beds in the public hospital had been declared intermediate beds.

Dr. Collins went on to say that some of the Minister for Health's statements were justified in fact; but objection was taken to the sweeping nature of his statements, as reported.

The Minister for Health did not think that medical practitioners should be allowed to hold positions on hospital boards. He had said that many medical practitioners did not wish to hold these positions, and in many places in which they did hold them, they dominated the boards by their superior knowledge, intellectual capacity and personality, and perhaps dictated a policy that, according to the Minister for Health, was not in the best interests of the hospital. The Minister for Health wished to introduce legislation to prevent staff representation on hospital boards; he had remarked that the advice of the medical staff on technical matters could always be obtained.

Dr. Collins then went on to discuss national medical insurance. This subject was now figuring in practical politics and had been mentioned by all parties during the recent election campaign. Many members of the medical profession thought in a vague way that national insurance would be a good thing for the profession; but most of them knew little about it. The subject must be studied. Dr. Collins wanted to know what the great bulk of medical practitioners thought of it. Few seemed to know that if national insurance was the same as in England, the medical practitioner would have to do, for the insurance fee, all the things he would do in his ordinary practice. National insurance as in England was not by any means of advantage to the profession.

#### Friendly Society Lodge Practice.

##### *Proposed Amendments to the Common Form of Agreement between Medical Officer and Friendly Society Lodge.*

It was resolved, on the motion of Dr. W. F. D. La Touche, seconded by Dr. A. G. Brydon:

That the Common Form of Agreement, Section 26, Sub-Sections (c), (e) and (f), be amended in the following respects, namely, that the words "or her" be inserted immediately following the word "him" in each of these Sub-Sections.

Dr. C. H. E. Lawes asked whether there were any particular reasons for the proposed alterations. He did not think they were worth while, as altering the Common Form of Agreement was not a simple matter. The amendments would have to be submitted to the friendly societies for their approval, and a great deal of printing would have to be done, necessitating considerable expense. In law he thought that "man" included "woman" and that the rule would be held to include "woman" if the member happened to be a woman.

Dr. Kenneth Smith said the difficulty could be overcome by agreement with the friendly societies concerning the interpretation of the word "him".

Dr. W. F. Simmons said that the suggested amendment might be noted and that when at some time the form was being altered the amendment could be incorporated.

In declaring the motion carried, Dr. A. J. Collins said that he assumed that Dr. Simmons's suggestion would be approved by the delegates.

#### "Declaration Off" Forms.

It was resolved, on the motion of Dr. Kevin Byrne, seconded by Dr. E. A. Tivey:

That in friendly society practice "declaration off" forms should be supplied with butts.

Dr. W. H. Donald, Dr. A. T. Roberts and Dr. A. G. Brydon took part in the discussion.

**Motor Car Badges.**

It was resolved, on the motion of Dr. W. H. Donald, seconded by Dr. G. A. Buchanan:

That the necessity for doctors' car badges no longer exists, most waterways being now covered by bridges, and that a recommendation be forwarded to the Council urging the abolition of such badges.

Dr. W. H. Donald pointed out that the badges had been issued in 1927 to allow priority to medical practitioners at crowded punts, where it had sometimes been possible to be delayed perhaps half a day. It had been understood that the badge should be used only when the medical practitioner was engaged in his professional duties. The necessity for the badges no longer existed. Dr. Donald said that he had discussed the matter with the traffic police and they had informed him that they took no notice of the badges. If a medical practitioner's car was parked in an area where parking was prohibited, the medical practitioner was written to, and if he gave an assurance that he had left the car only to attend to his professional duties, no further action was taken. Many medical practitioners had developed the habit of claiming privileges by virtue of the badge; this was bad.

Dr. Kevin Byrne said that several members of the Canterbury-Bankstown Medical Association had been informed by the police that the badge did help them to avoid delays and minor difficulties. If the police thought the need for the badges had ended, they would make their views known.

Dr. A. C. Thomas said that his Association had instructed him to support the motion. His Association was opposed to the setting up of a privileged class in the community.

Dr. J. Kerr suggested that there were probably places in the country where the badge was useful; he knew that he, as a country medical practitioner, found the badge of value when he visited the city, where he was unfamiliar with the traffic regulations. If a man did not want the badge he was at liberty to take it off.

Dr. W. H. Donald pointed out, in reference to Dr. Kerr's remarks, that of roughly 1,000 medical practitioners in the city 500 had badges, and of 600 in the country 120 had badges.

Dr. A. J. Gibson, Dr. R. C. Traill, Dr. Hugh Hunter, Dr. Kenneth Smith and Dr. G. M. Barron also took part in the discussion.

**Surgical Instruments et cetera.**

It was proposed by Dr. Kevin Byrne, seconded by Dr. B. G. Wade, *pro forma*:

That in view of the prices charged for surgical instruments and supplies, anaesthetics *et cetera*, the time is ripe for the New South Wales Branch of the British Medical Association to sponsor the establishment of an organization to supply the needs of the profession.

Dr. W. F. Simmons discussed the high price of anaesthetic drugs. There were sometimes different prices in different districts for the same article. He pointed out also that in New Zealand ethyl chloride could be obtained for 2s. 9d. per 100 cubic centimetres, whereas in Sydney, until recently, the cost had been 11s. 6d. The drug was admitted to New Zealand duty-free, whereas there was a duty of 6s. per 100 cubic centimetres in Australia.

Dr. E. A. Tivey asked whether the constitution of the British Medical Association allowed it to enter into trade.

Dr. J. G. Hunter said that it would be necessary to establish a special agency. A difficulty would be in the large capital outlay that would be necessary.

Dr. Kenneth Smith said that all surgical and medical supplies that could not be manufactured in the Commonwealth should be admitted duty-free. It was the duty of medical practitioners to see that their patients obtained the best at the least possible cost. There was no doubt that the cost was going up. All medical practitioners should do their best to convince everyone that freedom

of these supplies from duty was necessary. He took the opportunity to point out to delegates that certain surgical aids, such as splints, boots *et cetera*, could be obtained for charity patients from the Repatriation Department at cost price.

It was resolved by way of amendment, on the motion of Dr. A. G. Brydon, seconded by Dr. E. A. Tivey:

That in view of the prices charged for surgical instruments and supplies, anaesthetics *et cetera*, the time is ripe for the Council of the Association to protest to the Federal Council against the duties charged on surgical instruments, sera and other medical and surgical supplies.

Dr. C. H. E. Lawes said that, as any move aimed at the removal of customs duty would entail an appeal to the Federal Government, the only body able to deal with the matter was the Federal Council of the British Medical Association. If the New South Wales Branch made strong representations to the Federal Council, the latter's hand would be greatly strengthened.

Dr. K. S. M. Brown said that medical practitioners themselves were to blame in many ways for the high cost of medical and surgical supplies, owing to their tendency to prescribe proprietary medicines so freely. He did not agree with the proposal to start an agency.

**Workers' Compensation.****Medical Officers of Insurance Companies.**

It was proposed by Dr. R. C. Traill, seconded by Dr. W. F. D. La Touche:

That the Council of the British Medical Association register its disapproval of British Medical Association members accepting employment as medical officers by insurance companies for the treatment of injured workers.

Dr. R. C. Traill said that some members of his Association had complained of the actions of certain medical officers of insurance companies, employed in either a part-time or whole-time capacity. The patients attended the insurance company's medical officer under duress at times. Furthermore, the work was done by these medical officers for lower fees than those to which the medical practitioner was normally entitled. A great deal of work was in this manner being taken away from medical practitioners in industrial areas.

Dr. W. H. Donald said that he had been instructed to support the motion. At the same time, he asked, how many of the medical officers employed by insurance companies were members of the British Medical Association? And how many of those who were members would resign in order to keep their jobs and continue to make a living?

Dr. A. T. Roberts said that he had been under the impression that the motion referred to medical officers employed in a part-time capacity being called in by the insurance companies at special fees. The members of his Association had no objection to the whole-time medical officers of insurance companies.

Dr. B. G. Wade said he thought that it was the companies rather than the medical officers that were to blame for unethical conduct. The motion would be better if its object was the issuing of a direction to insurance companies. He did not believe that medical officers would resign from their positions because of an instruction from the British Medical Association.

Dr. L. A. Dey said that the insurance companies would not give up their clinics; the monetary considerations were of too great importance.

Dr. R. C. Traill said that there was no suggestion that the insurance companies should do away with their assessors. If their medical officers worked in accordance with Schedule "E" there would be no objection; but they did not.

Dr. G. A. Buchanan said that if the New South Wales Branch of the British Medical Association officially frowned on these positions, it seemed to him that there would be a

danger of forcing the decent men out and driving the insurance practice into the hands of less desirable persons. Furthermore, if a man held a job that he knew was frowned on, he would perhaps tend to become antagonistic to the Branch and its members and methods. He opposed the motion, as he thought the proposals, if carried out, would do more harm than good.

Dr. Kenneth Smith asked what was the position of the worker if he insisted on his right of choosing his medical attendant? What would be the worker's attitude if he was threatened with discharge from his employment? The worker had to be considered in this matter.

It was resolved, by way of amendment, on the motion of Dr. R. C. Traill, seconded by Dr. W. F. D. La Touche:

That no member of the Association, employed by an insurance company, shall do anything or take any action that will in any way interfere with the right of injured workers to choose their own medical attendant.

Dr. J. G. Hunter said that the matter under discussion was one that had given the Council a great deal of concern. Insurance companies declared that there was no dureas. From time to time instances of alleged breaches of ethics had been brought to the Council's notice; but in almost every case investigated the patient had failed to support his medical attendant. From time to time Dr. Hunter had interviewed medical officers of insurance companies and they had always assured him that they did not interfere with the patient's choice. The insurance companies, of course, in endeavouring to persuade employers to send their injured workers to the companies' medical officers, stressed the economical side, pointing out that the smaller the medical expenses were, the smaller would be the insurance premiums. A great difficulty to overcome was the attitude of the worker; he was afraid that if he did not go to the insurer's doctor he would lose his position.

Dr. K. S. M. Brown, Dr. A. C. Thomas, Dr. G. M. Barron, Dr. Kevin Byrne, Dr. A. G. Brydon and Dr. L. Flynn also took part in the discussion.

#### *Proposal to Amend the Status of the Medical Practitioner under the Workers' Compensation Act.*

It was proposed by Dr. Hugh Hunter, on behalf of the Western Medical Association, seconded by Dr. B. G. Wade, *pro forma*:

That steps be taken to have the *Workers' Compensation Act* amended so that the medical attendant is directly concerned with the Act, that is, he could sue the insurance companies directly.

Dr. A. M. Davidson, Dr. W. Vickers and Dr. K. S. M. Brown took part in the discussion.  
The motion was not carried.

#### *Fees for Minor Operations.*

It was proposed by Dr. Hugh Hunter, on behalf of the Western Medical Association, seconded by Dr. G. A. Buchanan:

That adequate fees for minor operations, suturing et cetera, be part of Schedule "E".

Dr. J. G. Hunter pointed out that the insurance companies were not prepared to pay for both operation and after-attendance. The medical practitioner could charge for the surgical procedure or for the consultations or visits as he chose. Dr. Hunter drew the attention of delegates to Note (1) of Schedule "E", which provided for procedures not specified in the schedule.

Dr. A. G. Brydon and Dr. K. S. M. Brown also took part in the discussion.

The motion was not carried.

#### *General.*

##### *Tariff Beds at Public Hospitals.*

Dr. A. T. Roberts said that at Newcastle Hospital the only beds were in the public wards; yet the board of directors had requested medical practitioners to send

patients for admission to tariff beds. He thought that, if Mr. Weaver's interpretation of the Act was correct, no beds at Newcastle Hospital could be legally registered as tariff beds.

Dr. Kevin Byrne said that at Canterbury Hospital ordinary private patients were not allowed in the wards, but patients under the *Workers' Compensation Act* were. On the other hand, at Saint Joseph's Hospital, Auburn, no patients other than public hospital patients were allowed in the wards.

Dr. A. G. Brydon said that at Armidale Hospital there were private, intermediate and public beds; but at other big hospitals in his district there were public beds only. Nevertheless at some of these hospitals he believed patients were charged fees by their medical attendants. In the country, in many instances, medical practitioners had to send their private patients to public wards; this was a hardship to the medical practitioners if they were not allowed to charge fees. Again, there were patients who had been treated, operated on perhaps, in a public ward and afterwards came to their medical attendant expressing a desire to pay fees. Perhaps this was what the Minister for Health had heard of.

Dr. J. G. Hunter quoted the *Public Hospitals Act*, pointing out that the medical attendant was not legally entitled to charge fees for the treatment of patients classified as public hospital patients.

Dr. B. G. Wade said that formerly it had been the practice in some country towns to treat private patients in public hospitals and to charge fees after the hospital had been paid. He pointed out that many private hospitals in the country were of an unsatisfactory standard, and private patients sometimes refused to go to them.

Dr. Kenneth Smith pointed out that the Act had done away with the old rules mentioned by Dr. Wade, and to the detriment of medical practitioners, as intermediate hospitals had not been built to take their place.

Dr. J. Kerr asked what could be done if a hospital board refused to allow intermediate beds.

Dr. A. J. Collins explained that all hospitals would eventually come under the community hospital scheme.

Dr. A. C. Thomas, Dr. K. S. M. Brown, Dr. W. F. Simmons, Dr. B. G. Wade and Dr. K. Inglis also took part in the discussion.

#### *Pathologists in the Country.*

Dr. W. F. Simmons, Dr. G. A. Buchanan, Dr. A. T. Roberts and Dr. Kevin Byrne took part in a discussion on the position of pathologists on the staffs of country hospitals.

#### *Medical Attention for Unemployed.*

Dr. J. Kerr asked whether anything more was being done concerning the payment of medical practitioners for attendance on unemployed persons and their dependants. The statement that the treatment of the unemployed was now provided for was not accurate. One of the members of his Association had attended twenty-five unemployed persons and had received payment only for attending one of them. A member of his Association had been receiving sixpence a week from each of a number of unemployed persons for the provision of medical attention. Since the Minister for Health had made his statement even this small income had gone.

Dr. J. G. Hunter said that the Health Department was not prepared to take any further steps for six months, as the provision of medical attention for unemployed persons was an experiment. As far as he could ascertain, no other government was doing anything. He thought there would be no real relief until a system of unemployment insurance was developed.

#### *Luncheon.*

The Council of the New South Wales Branch of the British Medical Association entertained the delegates at luncheon at the University Club.

## SCIENTIFIC.

A MEETING OF THE NEW SOUTH WALES BRANCH OF THE BRITISH MEDICAL ASSOCIATION was held at Saint Vincent's Hospital on September 20, 1934. The meeting took the form of a series of demonstrations by the members of the honorary staff.

## Contracted Toes with Eosinophilia.

Dr. O. A. A. DIETHELM showed a female patient, aged nineteen years, who had been sent into hospital by Dr. W. Maxwell, complaining of pains in both legs and feet. The pain was felt beneath the balls of the feet and generally over the whole of the front part of the feet. She had also pain in the toes. The pains in the left foot and leg had been present for about nine weeks, and in the right as well for four weeks before admission. Both feet had also been slightly swollen for two weeks before admission. She had occasional cramps of the legs and feet and she found it difficult to walk on account of the pain in the feet. Her previous health had been good except that she had suffered from attacks of "muscular rheumatism" on and off for about twelve months, ending two years previously. She had never suffered from sore throats and there was no history of rheumatic fever. She had never had asthma. Inquiry regarding her family history elicited the interesting fact that her father and two of her aunts had had hydatid disease. She herself had lived in the country for the greater part of her life. She had never suffered from any attacks of urticaria.

The patient was a healthy-looking girl. At the time of admission the toes were hyperextended at the metatarsophalangeal and flexed at the inter-phalangeal joints, some of the tendons standing out very plainly. The feet were slightly swollen at the time of admission, but this had now disappeared. The skin was very tender over the first left metatarsal. The longitudinal arches of both feet were slightly flattened. X ray examination of the feet revealed no abnormality except a very slight degree of bilateral *hallux valgus*. There was no evidence of organic lesion in any of the other systems.<sup>15</sup>

On July 17, 1934, the red blood cells numbered 4,260,000 per cubic millimetre; the haemoglobin value was 85% and the colour index 1.0. The leucocytes numbered 8,600 per cubic millimetre (neutrophile cells 52%, lymphocytes 26%, eosinophile cells 16%, mononuclear cells 4%, basophile cells 2%). There was a slight degree of anisocytosis; there were a very few poikilocytes, but no nucleated red cells nor other abnormality in size or shape of either red or white cells. On August 6, 1934, the leucocytes numbered 12,000 per cubic millimetre of blood, neutrophile cells being in the proportion of 24% and eosinophile cells 35%. On August 9, 1934, the leucocyte count was 15,600, of which 35% were neutrophile cells and 37% eosinophile. On August 17, 1934, the leucocytes numbered 10,200 per cubic millimetre of blood, the neutrophile cells being in the proportion of 31% and the eosinophile cells 35%. On August 27, 1934, the red blood cells numbered 4,200,000 per cubic millimetre, the haemoglobin value was 80% and the colour index 0.85; the leucocytes numbered 11,200 per cubic millimetre, 31% being neutrophile cells, 38% lymphocytes, 28% eosinophile cells, 2% mononuclear cells, and 1% basophile cells; there was some anisocytosis, with a tendency to decrease in size of the red cells; no macrocytes or nucleated red cells were seen. On September 10, 1934, the leucocytes numbered 12,000 per cubic millimetre of blood (neutrophile cells 32%, lymphocytes 34%, eosinophile cells 30%, mononuclear cells 3%, basophile cells 1%). No immature cells were seen, and all the white cells were normal in size and shape.

There was no reaction to either the Casoni or precipitin test for hydatids. Examination of faeces, done on three occasions, revealed no evidence of protozoa or helminths. X ray examination of the chest revealed no evidence of hydatid or any abnormality. X ray examination of the liver, splenic and kidney regions, revealed no abnormality.

The serum calcium content was 10.9 milligrammes per 100 cubic centimetres.

No gonococci were observed on microscopic examination of a smear from the vagina.

Dr. Diethelem said that Dr. Glissan had seen the patient and had come to the conclusion that the condition of the feet was clinically the same as he had described in *The Australian and New Zealand Journal of Surgery*, October, 1933, and which he designated "contracture of the toes", a condition that might occur in a "primary" form, in which there was no obvious factor to explain the deformity. Dr. Glissan thought that such a deformity might represent a biological reaction to the condition of modern civilization, where the feet tended less and less to function as propulsive organs. A "secondary" form was also found in association with the following foot conditions: claw-foot, equinus deformity, *hallux valgus*, cicatricial contracture following burns of the sole or dorsum or injuries or inflammatory conditions in the tissues of the dorsum of the foot. In this form the hallux was rarely involved, and the various toes might show varying degrees of contracture and one or two toes only might be affected, while one foot might be entirely unaffected. In the primary form all the toes were affected, though occasionally the great toes escaped, and the condition was bilateral, and usually there was a history of chronic gonorrhoea, while there was later wasting of the legs and feet. Dr. Glissan thought this case was one of primary contracture, on account of the distribution, though in so early a stage that there was not yet any appreciable wasting of the legs and feet. The presence of such a marked degree of eosinophilia was interesting, especially, too, on account of the coincident history in the patient's family of so much hydatid infection (father and two aunts). The condition was certainly not one of eosinophilic leucæmia, as the cells were always normal in appearance and mature, apart from lack of other evidence. The only other conclusion that Dr. Diethelem could come to, in view of the clinical and laboratory evidence, was that the eosinophilia was either familial or an expression of an allergic phenomenon, and was not due to any parasitic or hydatid infection.

## Syphilitic Aortitis and Gastritis.

Dr. Diethelem's next patient was a woman, aged fifty years, who complained of retrosternal pain, dyspnoea on exertion, and epigastric pain, which had existed for the previous nine months. Twelve months previously she had begun to experience sudden shooting pains behind the sternum; these had recently become much more severe and more persistent. She had also been troubled with dyspnoea on exertion, which also had increased in intensity. Recently there had been slight oedema of the feet at the end of the day. She had also had severe shooting pains behind the right shoulder, which lasted for half an hour or so and which were constantly recurring.

Nine months previously she had begun to suffer epigastric pain and fullness after meals, the pain being of a dull aching character and made worse by food. This had often kept her awake at night and tended to go through to the back. The pain was not relieved by alkaline powders. She experienced nausea at times, but never any actual vomiting. Flatulence was persistent and troublesome. She had not lost weight to any appreciable extent and had not shown any distaste for any particular article of food. Her appetite was always variable and never great. Her bowels were constipated, but had always acted regularly with aperients, and she always felt better after a good evacuation. Occasionally she had noticed her stools were dark in the previous six months, but it was difficult to be sure whether this was due to melæna or administration of bismuth. She suffered from severe occipital headaches, which were often worse at night. She had borne four children, all healthy and well, and had had one miscarriage. She had last menstruated six months previously.

Examination revealed a prominent bulging of the manubrium and upper part of the sternum. No precordial pulsation was visible. A slight pulsation could be felt in the jugular notch and a mild diastolic shock over the aortic area. There was impairment of the percussion note over the manubrium and to the left of this. The apex

beat was not visible, but was palpable in the fifth intercostal space; it was localized and not very forcible. The cardiac area of dulness was not increased in size. The heart sounds were fairly strong at the apex with a good diastolic interval and no adventitious sounds. Over the aortic area the first sound was soft and the second sound flat and accentuated. The pulse was regular and of good tension, perhaps a trifle stronger in the right wrist and possibly also slightly delayed in the left wrist. The systolic blood pressure was 168 and the diastolic 98 millimetres of mercury. The vessels were not greatly thickened, though palpable.

Examination of the lungs and nervous system revealed no abnormality. No mass was palpable in the abdomen, and there was no tendency to any thickening in the epigastrum or the left upper hypochondrium. The liver and spleen were not enlarged. The benzidine test revealed the presence of occult blood in the faeces. Examination of the stomach contents after a fractional test meal, done on two occasions at an interval of nearly a month, showed a definite subacidity on the first occasion and almost a complete achlorhydria on the second. There was an excess of mucus on each occasion. Blood was absent throughout, and there was no bile present.

X ray examination of the stomach and duodenum revealed no evidence of any organic lesion. The stomach emptied normally. X ray examination showed a marked aneurysmal dilatation of the aortic arch, the diffuse character of this suggesting specific aortitis. The heart was not enlarged. Three weeks later the radiologist reported that the enlargement of the aortic arch appeared to be getting larger; the heart shadow had not altered in size and shape.

The blood reacted (++) to the Wassermann test. The urine contained a trace of albumin and a few hyaline casts.

#### Leucoplakia and Carcinoma of the Vulva.

DR. CONSTANCE D'ARCY and DR. LEILA KEATINGE showed a married woman, aged fifty-one years, who had been treated by X rays for early *leucoplakia vulvae* on March 21, 1934. Altogether 1,200r had been given in four doses, through screening of two millimetres of copper and one of aluminium. Dr. D'Arcy and Dr. Keatinge said that this case represented the pre-carcinomatous stage. Radiation stopped irritation. This type of patient might be treated with advantage by parathyroid extract and calcium. This point had been brought home in the first instance by a case in which the block operation had been done without previous irradiation; fourteen days after operation there had been absolutely no attempt at union, although the whole area was clear; parathyroid extract, in a dose of 0.006 grammes (one-tenth of a grain) twice a day, and calcium had been given, and union had been complete within a month. This treatment had been proved to have prophylactic values.

The patient shown had remained quite well. No further treatment was being undertaken, but examinations were made at regular intervals.

Dr. D'Arcy and Dr. Keatinge also showed a married woman, aged fifty years, suffering from pre-carcinomatous *leucoplakia vulvae* without glandular involvement. X radiation therapy had been given in November, 1933 (1,200r through a screening of two millimetres of copper and one of aluminium in four split doses). When seen on January 29, 1934, the patient had greatly improved; but two small red patches remained persistently sore.

The operation of simple vulvectomy was performed on August 27, 1934. Healing after operation was satisfactory and the patient was apparently well. The pathological report was as follows:

Sections from glazed area of the vulva show well marked squamous cell activity. There is hyperkeratosis and thickening of the squamous layers. This must be regarded as premalignant, or even as early malignant, since the active younger and slightly anaplastic cells are tending to invade the deeper tissues.

Dr. D'Arcy and Dr. Keatinge also showed a married woman, aged fifty-three years, who had been first examined on April 13, 1934. The clitoris had been hard, enlarged and ulcerated for six months, and there had been vulvar irritation for six years. Treatment by X radiation was administered on February 24, 1934, 1,600r being applied to the entire vulva in five split doses, through a screening of two millimetres of copper and one of aluminium. On July 9, 1934, the ulcerated area had completely healed and the leucoplakia and irritation had disappeared; but the hypertrophy of the prepuce over the clitoris was a source of irritation and simple vulvectomy was to be performed.

Dr. D'Arcy and Dr. Keatinge next showed an unmarried woman, aged fifty years, whose condition had been regarded as inoperable by the surgeon who had referred her for X ray therapy. On May 27, 1931, and June 2, 1931, 1,200r were applied to the vulva and inguinal regions through a screening of 0.25 millimetre of copper and 1.0 millimetre of aluminium. On August 24, 1931, the lesion had disappeared. On September 31, 1931, small hard glands were palpable in both inguinal regions; the ulcer was still healed, but some slight deep induration was present. The patient returned on January 11, 1932, in great pain, seeking relief. She was then admitted to hospital and operation was performed as follows:

The block operation was performed, the vulva and glands being removed in one mass. The incision used commenced at the right anterior superior iliac spine, crossed over and encircled the left *labium majus*, crossed posterior to the vagina, encircled the right *labium majus*, crossed the incision at the *mons veneris* and finished at the left anterior superior iliac spine. The inner incision was placed as close to the urethra as possible and encircled the vagina and vestibule. The incision gave good exposure of the whole area without the flaps sloughing. Ample skin was removed and in no case had sloughing occurred in the skin area with this incision. The usual incision generally removed more skin than was necessary, and the flaps were liable to slough. The end result after suture was neat. In after-treatment an important point was to keep the incision dry and to expose the whole area to an ordinary electric lamp for approximately fifteen minutes twice a day.

According to the pathological report, on histological examination no malignant cells were found remaining in the vulva itself. Lymph glands sectioned had been metastasized, but the malignant cells appeared to have been considerably influenced by the irradiation and no longer appeared active.

Deep X ray therapy was given after the operation to both inguinal areas, 100r to each in six split doses through two millimetres of copper with one millimetre of aluminium. The X ray therapy was concluded on May 13, 1932, and although the patient's condition had been considered hopeless three and a half years ago, she was now apparently free from disease.

Dr. D'Arcy and Dr. Keatinge explained that these four cases had been selected from a series to illustrate four different stages of the disease and to show how the treatment was modified to suit each particular lesion. In studying the cases treated during the last five years they had learned and wished to emphasize the following points:

1. An inoperable cancer of the vulva might be made operable by deep X ray therapy.
2. A suitable interval of time should intervene between the X radiation and surgery, otherwise there might be excessive bleeding at operation, failure of union of flaps; this might progress to necrosis. They maintained that this interval should not be less than eight weeks.
3. Judging by the cut section, all superficial growth was destroyed by X radiation, but cancer cells still existed in the glands, although they might appear inactive at the time of examination.
4. X radiation prepared a foul septic area in such a way that first intention healing occurred after operation. Usually the risk of sloughing and suppuration was very serious in this operation at any time.

5. It was essential that the block operation should be performed in one sitting. The whole of the glands in inguinal and femoral areas must be cleaned out and use of the diathermy knife was always advisable, when it was available.

#### Manipulative Treatment of Backache.

Dr. H. A. SWEETAPPLE showed three patients whose backs had been manipulated for chronic pain in the back.

The first, a married woman, aged thirty-five years, domestic duties, had had pain in the left lower part of the back for twelve months; the pain was relieved by rest. Examination revealed marked tenderness in the region of the left-posterior superior iliac spine and marked bilateral "flexible flat-foot". Routine treatment for flat-feet was given for three weeks until her posture was improved. At the end of this period her backache was unaltered. Her back was then forcibly manipulated under general anaesthesia and she returned to the massage department for deep massage to the extensors of the spine and forced movements to the back. A week later the pain had gone and she felt freer and more supple and she walked better. This improvement had been maintained.

The second patient, a married woman, aged thirty-eight years, domestic duties, suffered in a similar way. She did not have "flat-feet", but X ray examination revealed slight osteoarthritic lipping of the anterior margins of the lumbar vertebral bodies. Her back was manipulated and she had the same after-treatment in the massage department. Two weeks later she had lost her pain and tenderness and said she "felt cured". Whereas previously she had often been unable to stoop or lift anything, she now suffered no such disability.

The third case was interesting. The patient was a seaman, aged forty-three years, who nine months previously had been struck in the back by a whirling winch handle. The blow was sufficient to cause haematuria for a week. Since the accident he had been completely disabled by a constant pain in the region which was struck; the pain was aggravated by any trunk movement. If he attempted to lift anything he got severe pain in the back and his lower limbs collapsed. On examination there was constant tenderness in the right sacro-spinalis muscle mass, and he was unable to rise against the slightest resistance. The straight leg-raising test revealed limitation on the right side, by pain and hamstring spasm, at 60°. X ray examination revealed slight lipping of vertebral bodies and no other bone lesion. The diagnosis made was intramuscular and perimuscular adhesions, and his back was manipulated under general anaesthesia. During the manipulation, a hand placed over the area complained of could feel a pronounced sensation of tearing. Five days later the patient said he "felt a new man" and could move more freely, though there was still a lot of pain. Objectively there was no change, except that he could now rise against fair resistance. A week after this he was feeling so much better that he attempted to lift a bed and immediately collapsed with pain in the back and reflex inhibition of his hamstrings. Dr. Sweetapple pointed out that it was obvious in this case that the manipulation had been excessive and he had attempted to lift the bed while his back was in a condition of acute trauma. He was strapped for a week and was now to resume massage and exercises on a lower scale. It might be necessary to manipulate his back again.

(To be continued.)

#### NOMINATIONS AND ELECTIONS.

THE undermentioned has been nominated for election as a member of the New South Wales Branch of the British Medical Association:

Harris, Godfrey Moses, M.B., B.S., 1932 (Univ. Sydney), Wyangala, New South Wales.

The undermentioned has been elected a member of the Victorian Branch of the British Medical Association:

Mancy, Alexander George, M.B., B.S., 1928 (Univ. Melbourne), Yackandandah.

#### Correspondence.

##### CALLOSITIES.

SIR: While perusing the letters and answers in a number of *The British Medical Journal* some weeks back, I came across an inquiry by a medical practitioner as to a simple and effective method of curing callosities on the soles of the feet short of surgical removal.

I should like to report that I have been successfully removing this calloused condition by diathermy. After anaesthetizing with cocaine injections, the diathermic needle is plunged into the callosity and the current turned on until the hardened tissue glows. This occurs in a second or two with the bipolar method of application. Several stabs are made to insure that the whole of the thickened epidermis is treated and the patient is told to return for observation. One sitting is generally sufficient. I think the success of this treatment should be widely known; it is quick, practically painless and does not prevent the patient from walking about in his ordinary avocation.

I had thought of writing to *The British Medical Journal*, but considered that it would be more seemly to publish this answer to the inquiry through our own periodical.

Yours, etc.,

E. W. J. IRELAND, M.B., C.M.

Hobart,  
October 11, 1934.

#### FOCAL INFECTIONS.

SIR: In your issue of today's date there is a report of an article on "The Part Played by Focal Infections in Medicine Today". On page 536 the writer says: "Another aspect of the case which may help to strengthen these views has occurred to me." Possibly the inspiration for what follows will be found in a letter under "Cancer" in the correspondence columns of this Journal of October 27, 1933. A fuller statement of the subject is now in the publishers' hands, the title being "The Interaction of the Blood and Lymph Glands".

Yours, etc.,

D. MONTGOMERIE PATON.

197, Wattletree Road,  
Malvern,  
Victoria,  
October 27, 1934.

#### Obituary.

##### JOHN LOFTUS CUPPAIDGE.

DR. JOHN LOFTUS CUPPAIDGE, whose death was announced in a recent issue of this journal, was born at Dublin in 1856. He studied medicine at Trinity College, Dublin, and graduated as Bachelor of Medicine and Bachelor of Surgery in 1884. Subsequently he took the degree of Doctor of Medicine. Coming to Australia soon after graduation, he practised at Roma, Queensland. In 1896 he went to England and practised for six years at Totnes, South Devon. After returning to Queensland he took up practice at Gympie and remained there till his retirement three years ago. He was a keen sportsman and played Rugby Union for his university and for Ireland. For many years he commanded the Fifth Light Horse Field Ambulance at Gympie. At the outbreak of war in 1914 he was sent to Townsville, where he established a base hospital. Some years ago he was awarded the Colonial Auxiliary Forces Officers' Decoration and he retired with the rank of Colonel.

## ANGUS MACINNES.

We regret to announce the death of Dr. Angus MacInnes, which occurred on October 31, 1934, at Mosman, New South Wales.

## ROBERT AUGUST MEEK.

We regret to announce the death of Dr. Robert August Meek, which occurred on November 1, 1934, at Brisbane, Queensland.

## Books Received.

**THE CASE FOR FAITH-HEALING**, by J. D. Beresford, with preface by H. R. L. Sheppard, D.D.; 1934. London: George Allen and Unwin, Limited. Crown 8vo., pp. 186. Price: 5s. net.

**EMPIRE SOCIAL HYGIENE YEAR-BOOK**, 1934, prepared by the British Social Hygiene Council Inc.; First Annual Edition; 1934. London: George Allen and Unwin, Limited. Demy 8vo., pp. 509. Price: 15s. net.

**RECENT ADVANCES IN OPHTHALMOLOGY**, by S. Duke-Elder, M.A., D.Sc., Ph.D., M.D., Ch.B., F.R.C.S.; Third Edition; 1934. London: J. and A. Churchill. Demy 8vo., pp. 444, with illustrations. Price: 15s. net.

## Diary for the Month.

Nov. 13.—Tasmanian Branch, B.M.A.: Branch.  
Nov. 13.—New South Wales Branch, B.M.A.: Executive and Finance Committee.  
Nov. 14.—Victorian Branch, B.M.A.: Branch.  
Nov. 20.—Tasmanian Branch, B.M.A.: Council.  
Nov. 20.—New South Wales Branch, B.M.A.: Ethics Committee.  
Nov. 21.—Western Australian Branch, B.M.A.: Branch.  
Nov. 21.—Victorian Branch, B.M.A.: Clinical.  
Nov. 22.—New South Wales Branch, B.M.A.: Clinical.  
Nov. 23.—Queensland Branch, B.M.A.: Council.  
Nov. 27.—New South Wales Branch, B.M.A.: Medical Politics Committee.  
Nov. 28.—Victorian Branch, B.M.A.: Council.  
Nov. 29.—South Australian Branch, B.M.A.: Branch.  
Nov. 29.—New South Wales Branch, B.M.A.: Branch.

## Medical Appointments.

Dr. J. S. Verco (B.M.A.) has been appointed temporary Honorary Clinical Assistant to the X Ray Department, Adelaide Hospital, Adelaide, South Australia.

Dr. M. Hoban has been appointed a Certifying Medical Practitioner at Avoca, Victoria, pursuant to the provisions of the *Workers' Compensation Act*, 1928.

## Medical Appointments Vacant, etc.

For announcements of medical appointments vacant, assistants, locum tenentes sought, etc., see "Advertiser", pages xiii, xiv, xv.

**COMMONWEALTH OF AUSTRALIA:** Government Medical Officer. **DIRECTOR-GENERAL OF HEALTH, CANBERRA, F.C.T.:** Medical Officers.

**HORNBY DISTRICT HOSPITAL, HORNBY, NEW SOUTH WALES:** Resident Medical Officer.

**IPSWICH HOSPITAL, IPSWICH, QUEENSLAND:** Resident Medical Officer.

**LAUNCESTON PUBLIC HOSPITAL, LAUNCESTON, TASMANIA:** Resident Medical Officers.

**PERTH HOSPITAL, PERTH, WESTERN AUSTRALIA:** Resident Medical Officers.

**ROYAL HOSPITAL FOR WOMEN, PADDINGTON, SYDNEY, NEW SOUTH WALES:** Medical Officers.

## Medical Appointments: Important Notice.

MEDICAL practitioners are requested not to apply for any appointment referred to in the following table without having first communicated with the Honorary Secretary of the Branch named in the first column, or with the Medical Secretary of the British Medical Association, Tavistock Square, London, W.C.1.

BRANCH	APPOINTMENTS
<b>NEW SOUTH WALES:</b> Honorary Secretary, 135, Macquarie Street, Sydney.	Australian Natives' Association. Ashfield and District United Friendly Societies' Dispensary. Balmain United Friendly Societies' Dispensary. Friendly Society Lodges at Casino. Leichhardt and Petersham United Friendly Societies' Dispensary. Manchester Unity Medical and Dispensing Institute, Oxford Street, Sydney. North Sydney Friendly Societies' Dispensary Limited. People's Prudential Assurance Company Limited. Phoenix Mutual Provident Society.
<b>VICTORIAN:</b> Honorary Secretary, Medical Society Hall, East Melbourne.	All Institutes or Medical Dispensaries. Australian Prudential Association, Proprietary, Limited. Mutual National Provident Club. National Provident Association. Hospital or other appointments outside Victoria.
<b>QUEENSLAND:</b> Honorary Secretary, B.M.A. Building, Adelaide Street, Brisbane.	Brisbane Associated Friendly Societies' Medical Institute. Chillagoe Hospital. Members accepting LODGE appointments and those desiring to accept appointments to any COUNTRY HOSPITAL are advised, in their own interests, to submit a copy of their agreement to the Council before signing.
<b>SOUTH AUSTRALIAN:</b> Secretary, 207, North Terrace, Adelaide.	Officer of Health, District Council of Elliston. All Lodge Appointments in South Australia. All Contract Practice Appointments in South Australia.
<b>WESTERN AUSTRALIAN:</b> Honorary Secretary, 205, Saint George's Terrace, Perth.	All Contract Practice Appointments in Western Australia.
<b>NEW ZEALAND (Wellington Division):</b> Honorary Secretary, Wellington.	Friendly Society Lodges, Wellington, New Zealand.

## Editorial Notices.

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